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Abstracts Selected for Platform Presentations

PL#1

POTENTIAL ADVERSE EVENTS FOLLOWING SPINAL MANIPULATION: A COMPARISON BETWEEN 3 DISCIPLINES.

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Background & Purpose Spinal manipulation is used by a variety of healthcare providers in the treatment of neuromusculoskeletal disorders. Its safety is often a topic of debate, despite the infrequent nature of adverse events (less than 1 in 3 million). No one has directly compared the incident of adverse events across professions. The purpose was to identify and compare adverse events between 3 different medical disciplines that use spinal manipulation in standard practice. **Methods** Patients empaneled to a primary care clinic in the Military Health System (MHS) with an initial spine or shoulder complaint from 1 January to 31 December 2009 were followed for 1 year. Care that included spinal manipulation by physical therapists (PT), chiropractors (DC), or osteopathic physicians (DO) was captured using the MHS Management Analysis and Reporting Tool (M2). Potential adverse events occurring within 7 days of the manipulation event were identified. **Results** From 6706 initial encounters with potential manipulation procedure codes, 1084 encounter were identified as a potentially adverse event within 45 days, representing 337 unique subjects. Only 43 of these occurred within 7 days (DC=20, DO=14, PT=9). After qualitative analysis of each potential case, none of the potential adverse events could be attributed to spinal manipulation in either group. **Discussion - Conclusions** There was no evidence of serious harm after the use of spinal manipulation in this cohort. In addition, potential adverse events were not greater in any of the three groups. We encourage future studies to also compare efficacy and healthcare costs.

PL#2

THE RELATIONSHIP BETWEEN PAIN, VIBRATORY DETECTION DEFICITS, IMPAIRED PROPRIOCEPTION AND FUNCTION COMPARING CHRONIC KNEE OSTEOARTHRITIS AND POST REHABILITATED ACL RECONSTRUCTION

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Background & Purpose Hypoesthesia, or partial loss of sensitivity to sensory stimuli has been reported in knee osteoarthritis (OA) and following anterior cruciate ligament rupture, with deficits reported in proprioception and vibration detection threshold (VDT). The purpose of this study was to explore the relationship between pain, VDT, proprioception and function in individuals with chronic knee OA compared to a non-chronic ACL reconstruction (ACLR) group. **Methods** Fifteen individuals (mean age=55±7yrs) with tibiofemoral OA and 15 subjects ≥12 months ACLR (age=28±7yrs;76±45 months post-surgery) participated. Measurements included VDT (bioesthesiometer), proprioception (threshold to detection of passive movement), pain measures (Numeric Pain Rating Scale), function (Knee Outcome Survey-Activities of Daily Living Scale (KOS)) and isometric quadriceps strength. **Results** Knee OA subjects reported 3.1±3.0 resting pain, 6.2±2.6 worst pain, and 56±16% on KOS, indicating almost 50% functional deficit. ACLR subjects reported 0 resting pain, 2.1±1.8 worst pain and KOS of 86±13%. In both groups, no significant between-limb quadriceps strength deficit was found, however deficits in VDT and proprioception were demonstrated at affected compared to contralateral knee ($p<0.05$). Correlations of pain severity to hypoesthesia were as follows: to proprioceptive deficits in knee OA (r=.55) and ACLR (r=.26); to vibratory deficits in knee OA (r=.25) and ACLR (r=-.07). A moderate relationship was also found between functional and proprioceptive deficits in ACLR but not the OA group. **Discussion - Conclusions** Several factors may determine functional deficits in chronic knee conditions, however pain related somatosensory deficits may contribute. Controlling pain in this population may be an important rehabilitation strategy for improving function.

PL#3

TREATMENT OF PATIENTS WITH CHRONIC BICIPITAL TENDINOPATHY WITH DRY NEEDLING AND ECCENTRIC EXERCISE: A CASE SERIES.

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Background & Purpose Chronic tendinopathy of the long head of the bicep (LHB) is a common condition and is difficult to treat. Eccentric exercise (EE) is an effective treatment for certain tendinopathies. Dry needling (DN) has been advocated for tendinopathy to induce bleeding and a healing response. The effect of these interventions on bicipital tendinopathy in unknown. The purpose of this case series is to describe the use of EE and DN in 3 patients with chronic LHB tendinopathy. **Description** All 3 patients had symptoms > 6 months, pain to palpation of the LHB, positive Speed's and Yergason's tests, and had failed traditional physical therapy. Patient 1 was a rock climber with symptoms for 12 months and a QuickDASH of 27%. Patient 2 was a rock climber with symptoms for 7 months and a QuickDASH of 34%. Patient 3 was a volleyball player with symptoms for 18 months and a QuickDASH of 22%. All 3 patients were treated with 5-8 sessions of an EE program and DN into the most painful and/or thickened areas of the tendon 20-30 times per session. **Outcomes** At the end of treatment, Patient 1 had a final QuickDASH of 7%, and a GROC of +6, patient 2 had a final QuickDASH of 0% and a GROC of +7, and patient 3 had a final QuickDASH of 11% and a GROC of +5. **Discussion - Conclusions** The findings of this retrospective case series suggest that EE and DN may be beneficial in patients with chronic LHB tendinopathy.

PL#4

THE EFFECTS OF THE SPINAL MANIPULATION PROHIBITION ON PHYSICAL THERAPISTS' DECISION TO PRACTICE IN WASHINGTON STATE

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Background: For over 70 years, physical therapists have been educated and trained to practice manual therapy techniques, including spinal manipulation. Current research indicates that spinal manipulation is the most effective and successful treatment option for patients with acute low back pain, and is recommended by clinical practice guidelines for patients with mechanical neck pain. Additionally, manipulation has been proven safe and efficacious, exhibiting an estimated rate of serious side effects in only 1 in 100 million. Despite these facts, spinal manipulation by physical therapists continues to be prohibited by statute in Washington State. **Purposes:** 1. To demonstrate that the current prohibition of spinal manipulation is a factor in physical therapists' decision to practice in the state of Washington upon graduation. 2. Identify the number of new physical therapists who have made the decision to relocate to a different state, or are planning to relocate, due to the spinal manipulation prohibition. **Methods:** Data was collected as a follow up to surveys conducted in 2008 and 2011, which asked DPT students in Washington State, the effect the spinal manipulation prohibition would have on their decision to practice in Washington state upon graduation. An online survey was sent to the graduating classes of 2009-2013 of the three physical therapy schools in Washington State, containing 7 multiple-choice questions relating to their current practice as physical therapists. **Results:** 227 licensed physical therapists responded to the survey (48% response rate); 159 (70%) currently practice in an orthopedic setting. Due to the prohibition on manipulation, 36 (23%) physical therapists now practice in a state other than Washington, with another 23 (15%) currently considering relocation if the prohibition is not lifted. **Discussion - Conclusions:** The prohibition on manipulation significantly impacts physical therapists' decision to practice in Washington State upon graduation. This supports earlier conclusions drawn from the 2008 and 2011 student surveys.

PL#5

IS THERE A DISTRACTION COMPONENT DURING POSTERIOR MOBILIZATION OF THE GLENOHUMERAL? AN IN VIVO ANALYSIS USING ULTRASOUND IMAGING

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Background & Purpose Although posterior mobilizations of the shoulder joint are used in the examination and treatment of individuals with shoulder restrictions, the performance of those mobilizations

may be variable. Differences may be partially explained by the need to use subjective feedback during the technique that assists in guiding the force utilized, the amount of movement that occurs and the direction of the motion. The purpose of this study was to 1) measure the amount of humeral distraction that occurred during posterior humeral mobilizations; 2) determine if those measurements were reliable; and 3) correlate posterior and distraction measurements. **Methods** Twenty healthy subjects participated. In supine, the shoulder was positioned in 55 degrees of abduction, 30 degrees of horizontal adduction and neutral rotation. An ultrasound transducer was placed over the anterior glenohumeral joint and the position of the humerus recorded at rest and as a single examiner applied a grade one, a grade two and then a grade three posterior mobilization of the humeral head. Posterior and lateral movements of the humeral head during the mobilization were determined by measuring the position of the humeral head in reference to the coracoid process. To maximize the distraction and posterior movements, the movements that occurred between the rest and the grade three positions were analyzed. **Results** While the mean posterior movement during grade three mobilizations averaged 9.95mm with a minimum of 3.06mm and a maximum of 18.38mm, mean distraction during the posterior mobilizations was 1.53mm with a minimum of -3.62mm and a maximum of 7.00mm. The Intraclass correlation coefficient for the distraction was .801, slightly less than the ICC for the posterior movement (.901). There was no significant correlation between posterior measurements and distraction measurements. **Discussion - Conclusions** Although posterior mobilizations are described as forces that move the humerus in an anterior-posterior direction, accessory motion in both a lateral and a medial direction occurred. Similar to the ability of a clinician to use subjective feedback to determine force, sensory feedback may also be guiding the humeral head to avoid contact with the glenoid. As the orientation of the glenoid on the scapula can be anterior or posterior, changes in direction may be necessary. Mastery of techniques, therefore, cannot be limited to only force but must be supplemented by perception that guides force, direction and magnitude of motion.

PL#6

CAN MANUAL THERAPISTS DETERMINE RESPONDERS TO CARE AFTER THE FIRST VISIT?

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Background & Purpose Determining candidacy for manual therapy (MT) intervention has been described based on a number of methods; presently no single acceptable approach has been identified. Further, since most clinicians do not use one single method, we endeavored to determine whether the gestalt method of experienced manual therapists could identify individuals with low back pain who would significantly respond to MT intervention. **Methods** The study included 43 subjects from an ongoing randomized controlled trial that compared two forms of mobilization. Subjects received an examination and 4 intervention visits over two weeks by one of 4 clinicians. MT interventions were applied to the low back in either a prescriptive or a pragmatic manner, coupled with a standardized home exercise program. Numeric Pain Rating Scale (NPRS) and Oswestry Disability Index (ODI) scores were captured at baseline (means of 4.5 and 25.3, respectively) and at 1 month. After each subject's first visit, clinicians were instructed to determine whether they were good candidates for MT. A t-test was used to measure differences in percent change from baseline in those who were and were not identified as candidates for MT ($p < 0.05$ was considered significant). **Results** Average subject age was 39.7 (SD=19.7) and symptom duration was 269.3 weeks (SD=480.7 weeks). Patients identified as good candidates had better disability outcomes ($p=0.02$) at 1 month than those identified as non-candidates. Pain was not significantly different between groups ($p=0.33$). **Discussion - Conclusions** This study found that after one single visit, experienced manual therapists could identify who is likely to improved disability at 1 month. These findings suggest that determining best candidates for manual therapy is at least partly related to gestalt.

PL#7

IN-VIVO MEASUREMENTS OF HUMERAL MOVEMENT DURING GLENOHUMERAL INFERIOR MOBILIZATIONS

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Background & Purpose Inferior joint mobilization has been proposed as an assessment technique and an intervention for individuals with shoulder dysfunctions. By providing a consistent force to the humerus, an examiner can evaluate the stiffness or laxity in an inferior direction. If tight or if pain occurs, joint mobilizations can be performed using different grades to relieve pain or to increase movement. While such techniques are common, few quantitative in vivo measures of manual movement of the humeral head have been reported. The purpose of this study was to determine if the application of different grades of inferior mobilization significantly changed the humeral position. **Methods** Twenty-three healthy volunteers participated. Subjects were positioned supine with the shoulder in 55 degrees of abduction, 30 degrees of horizontal adduction and neutral rotation. Visualizing the humeral head and the acromion, ultrasound images of the superior aspect of the glenohumeral joint were taken with the arm at rest and as an examiner applied a grade 1, a grade 2 and then a grade 3 inferior mobilization to the proximal humerus. This process was repeated three times on each shoulder. Humeral head position was measured in reference to the superior aspect of the acromion and the amount of inferior movement determined by the distance the humeral head moved from the rest position. **Results** The mean differences between the rest position and a grade 1, a grade 2 and a grade 3 mobilization were 0.96mm, 2.44mm and 3.64mm respectively. Repetition did not significantly affect the amount of movement of a single grade of inferior mobilization. Intraclass correlation coefficients (ICC) for movements were moderate for grade one (ICC=.681) and good for grade 2 (.889) and grade 3(.898). The mean rest position of the humeral head was also consistent throughout testing and was not significantly altered by the inferior mobilizations. Hand dominance was not significantly associated with the amount of movement. **Discussion - Conclusions** Results support the ability of one examiner to reliably reproduce three different grades of inferior mobilization. Even though movements were less than one centimeter, subjective feedback was effectively used to consistently apply various grades of inferior mobilizations.

PL#8

FORCES UTILIZED DURING GLENOHUMERAL INFERIOR MOBILIZATIONS

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Background & Purpose The amount of force applied during mobilizations is determined through the feedback the examiner feels as the mobilization is performed. Too much force may injure tissues; too little force may negate positive effects. Few studies have investigated the relationship of the forces used during manual inferior mobilization of the humerus, the grades of mobilizations and the amount of movement of the humeral head. The primary purpose of this study was to determine the forces applied during in vivo glenohumeral inferior mobilizations and the associated humeral displacement. **Methods** Twenty-three healthy adults participated. With a subject in a supine position and the humerus placed in 55 degrees of abduction and 30 degrees of horizontal adduction, the ultrasound transducer was placed over the superior glenohumeral joint. An inferior mobilization force was applied through a hand held dynamometer. Ultrasound images were taken at rest and during a grade 1, a grade 2 and a grade 3 inferior mobilization. The maximum force used during each grade was recorded. The process was repeated three times on each shoulder. The humeral head position was measured in reference to the superior aspect of the acromion and the amount of movement determined by the distance the humeral head moved from the rest position. **Results** The average forces used during grade 1, grade 2 and grade 3 mobilizations were 8.4lbs, 20.5lbs and 31.5lbs respectively. Force production, within a single grade of mobilization, was consistent, with intraclass correlations ranging from .780-.897. Although forces were significantly different between grades, no significant correlations between force and movement were found within a single grade. Arm dominance was significantly associated with grade 2 and grade 3 forces with the mean force higher for the non-dominant arm than the dominant arm. **Discussion - Conclusions** Although the force used during inferior mobilizations increased with increasing grade, the amount of movement associated with that force was variable between subjects. The results of this study do not support the use of a single magnitude of force to master different grades of inferior glenohumeral mobilizations. Rather, this study supports the ability of a clinician to reliably use sensory feedback to adjust the magnitude of force between individuals and to vary force between the dominant and nondominant arms of a single individual.

PL#9

INFERIOR GLENOHUMERAL MOBILIZATIONS: THE EFFECT OF SHOULDER POSITION ON MOVEMENT AND FORCE

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Background & Purpose The open packed position (OPP) of the glenohumeral joint is often utilized during assessment of inferior glenohumeral movement and inferior mobilization techniques. With the shoulder in 50 degrees of abduction, 30 degrees of horizontal adduction and no rotation, the OPP is thought to minimize capsular tightness and to allow maximal intraarticular movement. Another movement associated with inferior humeral mobilization is long axis distraction. With the shoulder in a neutral position (NP), the humerus is distracted in an inferior direction resulting in an inferior movement of the humeral head. Few studies have compared these two positions to assist clinicians in determining which may be most effective in inducing inferior glide. The purpose of this study was to determine if inferior humeral movement was significantly different with the shoulder in the OPP versus the NP. **Methods** Twenty-three healthy adults participated. Subjects were placed in the OPP and an ultrasound transducer placed over the superior glenohumeral joint. As inferior mobilization forces were applied through a hand held dynamometer, ultrasound images were taken at rest and during a grade 1, a grade 2 and a grade 3 inferior mobilization. This process was repeated with the subject sitting in the NP. The maximum force used during each grade was recorded. The humeral head position was measured in reference to the superior acromion and the amount of movement determined by the distance the humeral head moved from the rest position. **Results** Movement was significantly greater in the NP than in the OPP during grade 1 mobilizations (1.77mm versus 0.96mm) and during grade 2 (3.83mm versus 2.44mm). Although grade 3 movements followed a similar trend, the inferior movement in the NP (4.50mm) was not significantly different from the movement in the OPP (3.64mm). Forces utilized during all grades of inferior mobilization in the NP were significantly greater than forces utilized during similar mobilizations in the OPP. **Discussion - Conclusions** Because inferior movement during a grade 3 mobilization is similar in the 2 positions yet the force needed is significantly less in the OPP, this research supports the use of the OPP for techniques in which full inferior translation is desired. Selection of positioning for grade 1 and grade 2 mobilizations may be dependent on the goal of the intervention as greater movement was found to occur in the NP position but less force was needed in the OPP.

PL#10

ORTHOPEDIC MANUAL PHYSICAL THERAPY FOR GLENOHUMERAL OSTEOARTHRITIS: A CASE STUDY

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Background & Purpose Comprehensive treatment strategies are needed for glenohumeral osteoarthritis (OA), especially in young, active adults. Prior dislocation with or without subsequent shoulder stabilization surgery complicates the clinical presentation and increases the risk of OA progression. The purpose of this case study is to describe an orthopedic manual physical therapy approach in a patient with glenohumeral OA. **Description** A 38-year-old male Army officer presented with two months of left shoulder pain, unrelieved with a subacromial injection. He reported a history of anterior-inferior dislocation with subsequent stabilization surgery 15 years prior and arthroscopic subacromial decompression 2 years prior. Physical examination demonstrated painful limitations in elevation and internal/external rotation, stiffness with accessory glides, and painful rotator cuff and scapular weakness. **Outcomes** Treatment consisted of manual physical therapy, reinforcing exercise and progressive functional activities tailored to the patient for 6 visits over 4 weeks. Shoulder pain and disability index (SPADI) scores decreased from 43% to 17% and the patient specific functional scale (PSFS) average score improved from 3.0 to 7.25. After 4 additional weeks of a home exercise program, the SPADI score was 4% and PSFS average score was 9.0. Improvements in self-reported function were maintained at 6 months. Four “booster” treatments were administered at 9 months sustaining outcomes through 1 year. **Discussion - Conclusions** In a young, active patient with glenohumeral OA, clinically meaningful short and long-term improvements in self-reported function were observed with manual physical therapy and exercise. Maintenance treatments at six to twelve month intervals may contribute to sustainment of long-term outcomes.

PL#11

THE USE OF A COMPARABLE SIGN AS A PROGRESSION GUIDE IN A PATIENT WITH SUBACROMIAL IMPINGEMENT SYNDROME: A CASE STUDY

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Background & Purpose Progression and clinical decision-making are typically guided by changes in outcomes tools, range of motion or special tests. Maitland defines a comparable sign as a functional motion or position that reproduces the patient's primary symptom, but literature is lacking documenting its use to guide clinical decision-making. This case report shows a comparable sign can guide clinical decisions throughout an episode of care for a patient with shoulder pain in the subacromial region. **Description** The patient was a 54 year-old male orthotics technician who presented with right shoulder pain and reduced motion. His chief complaints were pain while grinding orthotics and throwing a softball. He was treated with therapeutic exercise and manual therapy for five weeks and then discharged. Before, during and after each intervention, a comparable sign of pain free shoulder abduction range with internal rotation was assessed. The comparable sign was used to assess and guide decision making related to interventions. **Outcomes** The patient's comparable sign of right shoulder abduction with internal rotation increased from 80° to 134° through the course of treatment, which was symmetrical to the left shoulder. Functional tool measurements paralleled the results of the comparable sign with clinically meaningful improvements over the course of five weeks. The patient's Quick DASH score improved from 34.1% to 15.9%. The Patient Specific Functional Scale scores improved from 0/10 to 7/10 for throwing a softball and 6/10 to 10/10 while "grinding orthotics for 20 minutes without pain." The patient's maximum daily numeric pain rating scale also improved from 7/10 to 1/10. **Discussion - Conclusions** This patient demonstrated clinically meaningful improvements in all outcome measures utilized. The use of a comparable sign provided a valuable tool to assess and re-assess the status of the patient's condition prior to, during, and following interventions. The change in comparable sign provided instant, meaningful, and non-biased information to the clinician, which ultimately paralleled the changes in outcome measures. The comparable sign is often used by therapists, but literature is lacking documenting its use for guiding the decision making process. This case documents the use of a comparable sign to help guide the therapist's clinical decision-making process to address the patient's needs and goals without having to constantly use formal outcome tools.

PL#12

IMMEDIATE SYMPTOMS AND RADIOLOGICAL IMPROVEMENTS IN C4-C6 CERVICAL KYPHOTIC KINK FOLLOWING LOCAL DORSOVENTRAL MOBILIZATION IN A PATIENT WITH A 4-YEAR HISTORY OF NECK PAIN

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Background & Purpose Physical therapists use manual therapy to reduce neck pain and disability. The purpose of this case report was to examine immediate effects of local dorsoventral mobilization on clinical and radiological outcomes of a patient with a 4-year history of right-sided cervical and scapular pain. **Description** 34 year-old female reported initial incident 10-week postpartum. An acute flare of symptoms while breast-feeding resulted in extreme pain, muscle spasm and loss of cervical range of motion requiring a visit to the Emergency Room. Patient was bed ridden for one week. Interventions over the next three years included physical therapy, two rounds of chiropractic, acupuncture, massage and pain management with temporary symptom relief. In June 2013, she moved to attend graduate school. Worried about managing the rigor of school with chronic pain she was referred to physical therapy. At initial evaluation, she described symptoms as constant, intense tightness and pulling pain 3/10 in the muscles of the neck, medial scapula and sharp pain with end range cervical movements right rotation > flexion > extension. Disrupted sleep and acute flares of symptoms occurred monthly and lasted 48 hours. Limitations in cervical spine joint accessory motions, poor motor control, cervical muscle endurance and Neck Disability Index Score of 34 were observed. Weekly visits focused on

improving cervical joint accessory motion, motor control and endurance of the deep neck flexors. During follow up with the physiatrist at one month a kyphotic kink at C4-C6 was observed using a lateral radiograph. Seated grade IV segmental dorsoventral mobilization was performed at each level, 40 seconds, repeated 4 times. Lateral radiographs were repeated. **Outcomes** Lateral radiographs showed improved cervical lordosis. There was no report of pain with 3D coupled movement testing at C4/5 and C5/6, and pain free cervical extension increased. She reported uninterrupted sleep for three days post intervention. **Discussion - Conclusions** This is the first report of the use of seated segmental dorsoventral mobilization, which resulted in immediate reversal of a cervical kyphotic kink as validated by lateral radiograph, decreased pain, improved cervical range of motion and sleep tolerance. The patient is presently followed up with home instructions to maintain cervical lordosis and motor control retraining to sustain improvement.

PL#13

SYSTEMATIC REVIEW AND META-ANALYSIS ON THE EFFECTIVENESS OF CERVICAL MANIPULATION IN REDUCING PAIN AND FREQUENCY OF HEADACHES IN PATIENTS WITH CERVICOGENIC HEADACHES

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Background & Purpose To conduct a systematic review and meta-analysis on the effect of cervical manipulation alone on pain intensity and frequency of headaches compared with traditional physical therapy interventions in patients diagnosed with cervicogenic headache (CGH). **Methods** A systematic review was performed searching databases including: Embase, Cochrane, PubMed, PEDro, and grey literature including Google Scholar and clinicaltrials.gov. The search terms used were cervicogenic headache AND manipulation, cervicogenic headache AND low amplitude high velocity, cervicogenic headache AND adjustment, cervicogenic headache AND therapy, cervicogenic headache AND treatment. The results included 319 hits from Embase, 174 hits from Cochrane, 480 hits from PubMed, 90 hits from PEDro, 719 hits from Google Scholar, and 11 hits from clinicaltrials.gov. Five studies met the inclusion criteria and were used to conduct a meta-analysis. Our inclusion criteria for our meta-anlysis included: study must have been a randomized controlled trial (RCT), patients must have had a diagnosis of CGH, the treatment group received spinal manipulation, the control group received another physical therapy intervention, and outcome measurements had to include pain and frequency. Meta-analysis and subgroup meta-analyses were run using Biostat Comprehensive Meta-Analysis (ver.2) software. The standard difference of means effect size was used due to multiple outcome measurements. The random effects model was used due to variation in study methods. A p-value of <0.05 was used to assess statistical significance. **Results** There was an overall effect size of 0.540, indicating a medium effect size with a p-value of 0.033 using a 95% confidence interval (CI). Five out of the five studies found cervical manipulation alone to be more effective than traditional physical therapy interventions in reducing pain intensity and frequency of headaches, however only one study was found to be statistically significant with an effect size of 1.679 and a p-value < 0.001. **Discussion - Conclusions** These findings suggest that cervical manipulation as a treatment for CGH proved to be more effective than traditional physical therapy interventions in reducing pain intensity and frequency of headaches in this patient population. However, high heterogeneity possibly due to the small number of studies included necessitate further well designed studies in order to confirm the effectiveness of spinal manipulative therapy in the management of CGH.

PL#14

MANUAL THERAPY AND VESTIBULAR REHABILITATION FOR A COMPLEX CASE OF WHIPLASH ASSOCIATED DIZZINESS.

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Background & Purpose Dizziness and pain are commonly associated with whiplash associated disorder (WAD). Evidence supports the use of manual therapy for WAD-related neck pain and cervicogenic dizziness. Vestibular rehabilitation (VR) has also been found efficacious in managing WAD-related dizziness, however no studies have looked at combining these interventions. The purpose of this case report is to describe management, which included a combination of manual therapy and VR, for patient with

chronic pain and dizziness due to WAD. **Description** A 53 year-old female with 1-year history of neck pain, headaches and dizziness following an MVA was treated over three months. Initially cervical range of motion (ROM) was limited into all ranges, including upper cervical flexion and extension. Pain and hypomobility were found with passive accessory joint testing of cervical/thoracic, most notably at upper cervical spine. A positive head thrust test was found bilaterally, but was not consistent with any particular vestibular pathology. Joint mobilizations to the mid and upper cervical spine and thrust manipulation to the upper thoracic spine were applied. VR exercises were also performed, which consisted of adaptation and habituation exercises, specifically tailored to the patient's symptoms. Joint position error retraining and therapeutic exercises for the deep neck flexors and scapular muscles were also included. **Outcomes** Significant improvements were found on the Neck Disability Index (34 improved to 28), pain levels (8/10 improved to 4/10), the Dizziness Handicap Inventory (68 improved to 35), the Vestibular Rehabilitation Benefits Questionnaire (total score 66% improved to 40%) the Motion Sensitivity Quotient (43.95 improved to 18.06) and balance as measured by the Modified Clinical Test of Sensory Interaction on Balance (condition 2: 7 seconds improved to 30, condition 4: 3 seconds improved to 30). **Discussion - Conclusions** Manual therapy plus VR may reduce symptoms of dizziness and pain, and improve balance in those with chronic WAD.

PL#15

POST-CONCUSSIVE MANAGEMENT FOR RETURN TO WORK UTILIZING MANUAL THERAPY, VESTIBULAR REHABILITATION AND CERVICOCEPHALIC KINESTHESIA RETRAINING IN A PATIENT FOLLOWING WHIPLASH INJURY

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Background & Purpose Decision on return to work (RTW) in acute whiplash can be complicated by post-concussion symptoms. Nuanced clinical reasoning to ascertain potentially overlapping vestibular and cervicogenic components is essential when developing a multi-modal rehabilitation plan to optimize RTW status. Given the altered afferent information and resultant incongruent motor output, commonly proposed interventions include balance and vestibular retraining. However, orthopedic manual physical therapy (OMPT) is not well studied. While return to sport criteria are more universally known, there is paucity in the physical therapy (PT) research regarding RTW guidelines. The purpose of this case study is to describe a unique multi-modal management of a patient with post-concussive symptoms and dizziness, as well as, demonstrate the importance of post-concussion screening during progression of the patient to full RTW status. **Description** A 29 year-old female postal worker status post motor vehicle accident one month prior to PT, demonstrated neck and left shoulder pain, dizziness, visual dysfunction, balance deficits, decreased cervicocephalic kinesthesia, and positive post-concussive screening. Patient reported difficulty with concentration, skipping words while reading, decreased tolerance to external stimuli, and tinnitus. Multi-modal intervention included OMPT, cervicocephalic kinesthesia retraining and vestibular rehabilitation. RTW was facilitated with monitoring post-concussive symptoms and recommendations were communicated to the referring physician, which allowed for a collaborative and structured return to work. **Outcomes** The patient was able to RTW full time for one shift per day after twelve visits, eight weeks after PT began. Neck Disability Index scored improved from 42% to 16% (categorized as recovered). Deficits in concentration and delayed recall improved per Standard Assessment of Concussion. Long term follow up at one month included no exacerbation of symptoms and normalized delayed recall. **Discussion - Conclusions** Clinical reasoning to determine whether dizziness is cervicogenic origin, post-concussive, and/or due to vestibular dysfunction can assist with optimizing PT intervention selection and informs RTW decision making. This case provides rationale for the importance of inter-professional communication of patient response to physical and mental exertion. Further research is needed for gradual return to job demands in worker's comp related cases.

PL#16

CERVICOGENIC DIZZINESS POST CONCUSSION A CASE REPORT

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Background & Purpose While concussions may occur as a result of falls, motor vehicle accidents, and trauma, recent attention to this condition has been directed to those that occur in sport. The greatest frequency of sport related concussions occur in collision and contact sports such as football, hockey, lacrosse, basketball, and soccer. **Description** A 23-year-old former collegiate soccer player was examined and treated in physical therapy 2 years status post concussion on recommendation of her physician. The patient was screened and managed for post-concussion syndrome and vestibular involvement prior to the physical therapy initial examination which revealed constant and unchanging cervical pain, inability to visually focus, and dizziness with reading, computer work, and turning of the head. The physical examination was characterized by cervical spine hypermobility, lower trapezius and lumbopelvic core weakness, median neural tension, scapular trigger points, and an inability to recruit the deep neck flexors. The subject's Focus on Therapeutic Outcomes (FOTO) intake score indicated elevated fear avoidance. The cervical relocation test indicated errors greater than 6 degrees on all six attempts. **Outcomes** Phase I intervention was six weeks in duration and included postural correction, joint non-thrust manipulation, and the initiation of deep neck flexor training. The outcomes of Phase I included an improved ability to contract the deep neck flexors and a 40 point improvement on the FOTO in Fear Avoidance. The Neck Disability Index (NDI) at the end of Phase I indicated moderate disability (36%). Phase II intervention was 6 weeks in duration and involved a progressive in-clinic and home cervical spine and lumbopelvic stabilization program. The outcomes related to Phase II management included an improvement in the cervical relocation test to an error of less than 4.5 degrees for each of the 6 attempts, an improvement in the NDI to 8%, and an improvement in function on the FOTO tool to a score greater than predicted. **Discussion - Conclusions** Management of cervicogenic dizziness may include non-thrust and thrust manipulation, soft tissue mobilization, and strengthening exercises for the cervical musculature. This case illustrates the potential benefit of facilitating neuromuscular control of the cervical stabilizing muscles to address the cervical hypermobility and dizziness that may occur post-concussion. Further research is warranted to determine the efficacy of this intervention strategy.

PL#17

MUSCLE ENERGY TECHNIQUES FOR PATIENTS WITH LOW BACK PAIN MEETING CRITERIA FOR THE LUMBAR SPINAL MANIPULATION CLINICAL PREDICTION RULE

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Background & Purpose A validated clinical prediction rule (CPR) for the use of spinal manipulation for individuals with low back pain (LBP) exists, but even though the risks of adverse events are low, some patients and physical therapists exhibit fear over the use of spinal manipulation. Muscle energy techniques (METs) in patients with LBP have been shown to increase lumbar range of motion and decrease pain and disability levels, but no studies have looked at the use of METs in those who meet specific criteria for spinal manipulation. The purpose of this case series was to assess outcomes in those individuals with LBP who met the criteria from the spinal manipulation CPR but were instead treated with METs. **Methods** Twenty two patients (mean age, 43.3 years old; F=12, M=10) with LBP who met a minimum of three of the five spinal manipulation CPR criteria were treated for two visits with two METs and a home exercise program for lumbar ROM. Patients completed the Modified Oswestry Low Back Pain Disability Questionnaire (OSW), the Fear Avoidance Beliefs Questionnaire (FABQ) and the Numeric Pain Rating Scale (NPRS) before initial treatment and at subsequent visits. Study participation ended after completing the outcome measures before intervention at the third visit. **Results** All patients exceeded the minimal clinically important difference (MCID) in their OSW score, and nineteen of the patients achieved the >50% improvement that deemed success in the spinal manipulation study, with 55% achieving this improvement after the first visit. Twenty patients exceeded the MCID for the NPRS by the end of the study. Although not a variable evaluated in the validated CPR study, FABQ scores were assessed and all patients showed a decrease in their scores from the first to third visit. **Discussion - Conclusions** Every patient in this case series reported clinically meaningful functional improvement and twenty patients exhibited clinically

meaningful decreased pain levels after being treated for two sessions with METs. Nineteen patients were labeled successful by meeting the same criteria as those in the CPR study. Lastly, all patients involved in this study showed improvement in their FABQ scores. The researchers are currently investigating a larger sample size with a higher-level research design; however, METs may be a beneficial intervention in those with LBP meeting criteria for spinal manipulation.

PL#18

DEVELOPMENT OF AN ACUTE SPINE PROGRAM TO PROMOTE EARLY EVIDENCE BASED MANAGEMENT OF ACUTE SPINE PAIN WITHIN A COMMUNITY

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Background & Purpose Early physical therapy has been associated with optimal outcomes and lower health care costs in the management of low back pain. The purpose of this study was to determine the clinical effectiveness of an Acute Spine Program to promote early, evidence-based physical therapy within a community in the management of acute spine pain. **Methods** Local primary care physicians were contacted and educated on current evidence-based interventions using a PowerPoint presentation and video of thrust manipulations. Thirty patients entered the program through physician referral or direct access, such that the onset of acute cervical, thoracic, or lumbar pain was less than thirty days. The treatment-based classification system guided interventions, which included manual therapy and exercise. Patients completed the Focus On Therapeutic Outcomes (FOTO) survey at initial evaluation and discharge. Functional status scores (FSS) and number of physical therapy visits at discharge were recorded. **Results** A total of twenty-four patients completed the program. The average FSS at initial evaluation was 49.2/100. The average FSS at discharge was 80.6/100. The average functional change score of 31.3 exceeded the average FOTO predicted change score of 22.0. The average number of visits was 5.7. The FOTO predicted number of visits was 10.1. **Discussion - Conclusions** This study suggests an Acute Spine Program is an effective way to promote early physical therapy within a community and improve functional outcomes. Larger, multi-centered clinical trials are needed comparing the economic and clinical effectiveness of common interventions for individuals with acute spine pain.

PL#19

IMPLEMENTATION OF EVIDENCE-BASED PHYSICAL THERAPY PRACTICE GUIDELINES FOR LOW BACK PAIN: A PILOT STUDY

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Background & Purpose Prior research has shown increased adherence to Clinical Practice Guidelines (CPG's) using active education strategies such as the knowledge to action framework. The purpose of this pilot study was to determine if a knowledge to action quality improvement (QI) educational program would increase familiarity with CPGs and increase clinician utilization of CPG's for low back pain (LBP). The hypothesis was clinicians that received the QI education program would demonstrate greater knowledge and adherence to CPG's. **Methods** Clinical champions were selected to adapt published CPG's for local use and then be responsible for teaching the material. Twenty physical therapy staff at two outpatient hospital sites were selected to receive the education. Thirteen staff at two separate outpatient sites served as controls. Education strategies included hands on manipulation sessions, clinical rounds, electronic medical record algorithms, and staff meetings to address barriers. A pre-post survey was completed to assess confidence with the CPG's. Charge codes were divided into active versus passive categories with a criterion level of 75% active per site to determine adherence to CPG's. One-way ANOVA's for comparisons with $\alpha < 0.05$. **Results** Adherence to CPG's based on 18 months of prospective charge data was superior in training versus control sites ($p<0.006$). At the initial training site 24 months pre-intervention to 26 months post-intervention time series analysis was also significant ($p<0.001$). A trend was noted in the survey data for using CPG's after trainings at educational sites ($p<0.098$).
Discussion - Conclusions The knowledge to action educational program was successful in increasing

knowledge and adherence to CPG's for LBP. Future studies will examine the effects of increased CPG adherence on PT utilization and effectiveness.

PL#20

IN VIVO LUMBAR SPINE HEIGHT CHANGE FOLLOWING SUSTAINED LUMBAR EXTENSION POSTURE: COMPARISON OF STADIOMETRY VERSUS DIAGNOSTIC ULTRASOUND MEASUREMENTS

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Background & Purpose: Postural changes have been reported to decrease or increase fluid diffusion into the lumbar intervertebral disc, which suggests that posture changes can alter disc hydration. The use of stadiometer has been reported for measuring trunk height changes and researchers reported a correlation between sitting height measured by stadiometer and lumbar spine height measured by Magnetic Resonance Imaging (MRI). MRI is costly and stadiometry does not allow a specific spine segment measurement. The purpose was to compare trunk height measured by stadiometry to lumbar spine height (S1 to T12) change measured by diagnostic ultrasound (DUS) after a sustained 15 minutes lumbar extension posture. **Methods:** A convenience sample of 18 healthy adults was recruited. All subjects were tested in the following sequence: (1) lying supine for 10 min, (2) loaded sitting (9,5kg) and unloaded sitting for 5 min each; (3) supine lying for 15 minutes with passive lumbar extension and (4) unloaded sitting for 5 minutes. Both, DUS and stadiometer measurements were collected after each step of the testing sequence. **Results:** Following loaded sitting, trunk height (measured by stadiometry) decreased by 3.4 ± 1.6 mm, while following sustained lumbar extension, trunk height increased by 5.4 ± 3.5 mm ($p<0.05$). Concerning the lumbar spine height (measured by DUS), the observed modifications were similar to those observed for the sitting height. Following loaded sitting and sustained lumbar extension, LSH decreased by 3.8 ± 1.7 mm and increased by 6.2 ± 4.1 mm, respectively ($p<0.05$). Based on the mean differences (between the different steps of the testing sequence), the coefficient correlation between stadiometry and DUS measurements was 0.99 and no statistical differences were observed ($p>0.05$). **Discussion - Conclusions:** *In vivo* measurements of trunk height changes measured using stadiometry were strongly correlated with lumbar spine height changes measurements using ultrasound. Ultrasound seems to be a valuable technology, which could be used by clinicians in current practice for assessing the lumbar spine height changes as a reflection of disc hydration/dehydration.

PL#21

LUMBAR MANIPULATION FOR THE TREATMENT OF ACUTE LOW BACK PAIN IN ADOLESCENTS: A RANDOMIZED CONTROLLED TRIAL

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Background & Purpose Low back pain [LBP] is a common condition in adolescents. Although much has been written about the efficacy of lumbar manipulation for adults with LBP, little is known about its effectiveness in adolescents. The purpose of this study was to assess the effectiveness of lumbar manipulation on adolescents with LBP. **Methods** Patients were randomly assigned to receive lumbar manipulation or sham manipulation. All patients performed 4 weeks of physical therapy. Pain, Patient Specific Functional Scale [PSFS] and Global rating of change [GROC] were measured at evaluation, 1 week, 4 weeks, and 6 months. To address safety, patients who experienced a clinically significant decrease in function or increase in pain were classified as having an adverse reaction. **Results** We recruited 26 consecutive patients with acute LBP. 1 patient was excluded after being diagnosed with a spondylolysis, 25 patients remained for analysis. Both groups experienced significant improvement over time in all measures. The manipulation group had a statistically greater increase in function, with between-group differences of 2.63 (95% CI 0.32, 4.93). There were no differences between groups for pain or GROC. No increased risk of adverse reaction from manipulation was noted. **Discussion - Conclusions** Adolescents who received lumbar manipulation had significantly greater improvement in PSFS scores at 4 weeks. No differences

were noted for pain or GROC between groups. Lumbar manipulation appears to be safe in adolescents with no increased risk of adverse reaction. Further research needs to be done to identify factors that predict positive outcomes following lumbar manipulation in adolescents.

PL#22

A RANDOMIZED CLINICAL TRIAL OF THE EFFECTIVENESS OF THE COMPRESSION BELT FOR PATIENTS WITH SACROILIAC JOINT PAIN

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Background & Purpose No randomized clinical trials have been conducted to assess the short-term and long-term effects of the use of pelvic compression belts in addition to lumbopelvic stabilization exercises on the muscular response of the deep abdominals or disability level in patients with SIJ pain. The purpose of study is to examine the effect of the addition of a pelvic compression belt to a lumbopelvic stabilization program on disability, pain, and muscle thickness of the deep abdominals and perceived change due to intervention in patients with sacroiliac joint (SIJ) pain. **Methods** Thirty participants with unilateral SIJ pain were recruited and randomly assigned to one of two treatment groups: lumbopelvic stabilization exercises plus belt (LSE+belt) or lumbopelvic stabilization exercises (LSE) alone. Both groups received the same lumbopelvic stabilization program for 12 weeks with first 4 weeks under supervision. The LSE+belt group also received a pelvic compression belt for the first 4 weeks. Outcome measures collected at baseline, 4 weeks and 12 weeks included the Modified Oswestry Low Back Pain Disability Questionnaire (OSW), Numeric Pain Rating Scale (NPRS), and percent change of transverse abdominis (TrA) and internal oblique (IO) muscle thickness using ultrasound imaging. Four 2x3 ANOVAs (group x time) with repeated measures were used to analyze the OSW scores, NPRS scores, and percent change of muscle thickness for the TrA and IO. Mann-Whitney U tests were used to analyze the GROC scores. **Results** The ANOVA results revealed a significant interaction for percent change of TrA muscle thickness ($p = 0.004$), but not for the OSW, NPRS, or percent change of IO muscle thickness. Post-hoc analysis revealed that both groups increased the percent change of TrA muscle thickness from baseline to 4 weeks, but decreased from 4 weeks to 3 months; however the LSE group demonstrated a greater decrease. Further, the results demonstrated that all participants had significant improvements in pain and disability over time. Lastly, all participants showed improved GROC scores at 4 weeks and 3 months, but there was no significant difference between groups. **Discussion - Conclusions** Lumbopelvic stabilization exercises appear to reduce pain and disability in those with SIJ pain. However, the pelvic compression belt did not offer any additional benefit. Furthermore, all patients had increased muscle thickness of TrA in the first 4 weeks when they received a supervised lumbopelvic stabilization program.

PL#23

THE UTILIZATION OF MANUAL INTRARECTAL MANIPULATION IN THE EXAMINATION AND TREATMENT OF COCCYDYNIA: A CASE SERIES

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Background & Purpose: Painful coccydynia is a rare condition but can result in significant long term pain and disability. Currently there is no gold standard for diagnosis of this condition and treatment descriptions vary from management with manual therapy, non-steroidal anti-inflammatory medications, local cortisone injections, and surgical excision. Identifying individuals that will respond to conservative care is essential to reduce the consequences of long-term pain and facilitate optimal treatment outcomes. The purpose of this case series is to illustrate the utilization of intrarectal examination and manipulation to help guide clinicians in the diagnostic testing and clinical decision making for both conservative and surgical management of coccydynia. **Description**: Four women between the ages of 26-32 with persistent coccygeal pain that increased with prolonged sitting and intensified when transitioning from sit to stand were referred to a fellowship trained manual physical therapist. Two women reported pain after a traumatic event while the other two identified prolonged sitting as the cause of their symptoms. All 4 were examined utilizing intrarectal mobility and pain provocation techniques. All four were identified as having movement restrictions of the saccrococcygeal joint and were treated with mobilization over the course of two to three treatment sessions. **Outcomes**: Three of the four had complete resolution of pain and return to

sitting painfree at completion of treatment. Follow-up with three has found resolution of symptoms in sitting and function for one at 4 weeks, another at 6 months and one is over one year. The fourth individual only had temporary relief with manual therapy, was perceived to have an abnormal tissue structure and was subsequently referred for further testing. She went on to undergo surgical excision but remains painfree at 18 months post surgery. **Discussion - Conclusions Discussion:** Based upon our patients response to treatment we propose that utilization of intrarectal examination and a course of manual physical therapy is a viable safe first option to consider in the presence of coccydynia. Subsequent interventions with corticosteroids and or surgery may be considered if negative or minimal response to manual physical therapy intervention.

PL#24

TREATING SACRAL TORSION WITH MUSCLE ENERGY TECHNIQUE SIMULATED BY EXERCISE

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Background & Purpose Low back pain (LBP) is a common disorder that can be challenging to prevent, diagnosis, and treat. The annual costs are $12.2 to $90.6 billion in the US. While LBP can have many causes, the sacroiliac joint dysfunction is the source in 10% to 27% of patients for their LBP. Sacral torsion is one type of sacroiliac joint dysfunction presented with leg length discrepancy. Muscle energy technique (MET) is used to treat mechanical LBP. As the corrective force of conventional MET can be significant at times, osteoporosis is usually contraindicated. An alternative approach is to use exercise to simulate MET in treating sacral torsion.The purpose was to determine the effectiveness of exercise simulating MET in treating sacral torsion for a patient with chronic LBP. **Description** This was a single system study. The patient was a 79-year-old female with chronic LBP. Imaging indicated spinal stenosis and osteoporosis. Seated flexion test and sacral palpation in prone indicated positive for left on the left axis sacral torsion. The research design was an AB design. Interventions included exercise simulating MET combined with core stabilization and regular physical therapy care. Four sessions were delivered over 8 days. The simulating exercise was hip rotation in the right side lying with knee, hip and trunk all flexed. Outcome measurements included the Numeric Pain Scale (NPS), the Patient Specific Functional Scale (PSFS), and the Oswestry Disability Index (ODI). Sacral torsion was quantified as asymmetry of the sacrum using a modified digital inclinometer. **Outcomes** For the NPS, the subject's reported 8/10 baseline pain decreased to 1/10 after the 1st session. Her pain was eliminated to 0/10 for the 2nd and the 3rd sessions, then increased to 3/10 at the final session. For the PSFS, the subject's function (walking > 15 min, standing > 30 min, and housework) was 2.67 at baseline and increased to 6 at the final session. For the ODI, the subject's disability was severe (52%) at baseline, decreased to moderate after the 3rd session (32%) and the last session (36%). Initial sacral base measurement showed the right side deeper by 1 degree and was recorded 0, 0, 0, and 1 degree for each session. Initial inferior lateral angle measurement showed the right side deeper by 6 degrees and was recorded 1, 1, 0, and 1 degree for each session. **Discussion - Conclusions** Using exercise to simulate MET could reduce pain, increase function, and decrease disability while correcting the sacral dysfunction for patient with sacral torsion.

PL#25

ALTERNATIVE APPROACHES IN ORTHOPEDIC MANUAL THERAPY: A CRITICAL REVIEW OF THE LITERATURE ON YOGA AS AN INTERVENTION FOR CHRONIC LOW BACK PAIN

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Purpose Low back pain (LBP) has been identified by the World Health Organization as the leading cause of disability among American adults, with an economic impact estimated between $100-200 billion dollars in lost wages and productivity. The effects of orthopedic manual therapy intervention have been shown to be moderately effective in reducing symptoms of LBP in the short term; however, there is a specific need for long-term management of chronic pain through therapeutic exercise and lifestyle modification. In recent years, yoga has surged in popularity among American healthcare consumers as a form of alternative medicine. Physical therapists should be able to utilize current evidence of the benefits of yoga to help

guide their management of patients with chronic LBP. **Description** A systematic review of the literature was performed in 2012 to investigate the quality of evidence supporting yoga as an intervention for chronic LBP. Peer-reviewed scientific publications were searched in the following databases from their inception through the most recent search in May 2012: ProQuest, EBSCO, The Cochrane Database of Systematic Reviews, CINAHL, PEDro, PubMed, Ovid, and MEDLINE. The key words "yoga and low back pain" were used to gather evidence. Inclusion criteria were: low back pain of greater than 3 months duration as a primary symptom; pain, disability, and/or function as an outcome measure; male and female subjects age 18 and older. Lower quality literature such as case reports and anecdotal evidence were excluded. Six randomized control trials (RCT) and one systematic literature review were selected for comparison of strengths and weaknesses. All of the studies demonstrated positive outcomes in pain and functional measures when using yoga as an intervention for chronic LBP. **Summary of Use** Based on this review of current literature, physical therapists may conclude that yoga is an effective intervention for managing chronic low back pain and improving function in carefully selected patients. Prior to initiating yoga as a clinical approach, patients should be educated by their PT regarding their specific diagnosis, indications, and contraindications for performing yoga.

PL#26

PELVIC GIRDLE PAIN IN THE ANTEPARTUM POPULATION - PHYSICAL THERAPY CLINICAL PRACTICE GUIDELINES LINKED TO THE INTERNATIONAL CLASSIFICATION OF FUNCTIONING, DISABILITY AND HEALTH.

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Background & Purpose Examination, diagnosis, prognosis, intervention and the use of outcomes measures by Physical Therapists in the antepartum population with pelvic girdle pain should be guided by current evidence. The creations of clinical practice guidelines (CPGs) is a crucial process for examining and maintaining the validity of recommendations as well as provide classification and definition using the International Classification of Function (ICF) terminology related to impairment of body function, structure, activity limitations and participation restrictions. **Methods** 1) Using ICF terminology to a) categorize mutually exclusive impairment patterns to base intervention strategies and b) to serve as measures of change in function over course of care. 2) Description of supporting evidence was produced by a systematic searched MEDLINE, CINAHL, and the Cochrane Database of Systematic Reviews (through 2012) for any relevant articles related to prevalence, risk factors, examination, classification, outcome measures, and intervention strategies for pelvic girdle pain in the antepartum population. Each literary article was reviewed by two reviewers and required greater than 95% agreement among reviewers via Key Questions from the *Evidence Based Physical Therapy* for determination of article quality for the appropriate of level of evidence (I-V) established by the Centers for Evidence-Based Medicine and grades of evidence for strength according to the guidelines of Guyatt and modified by Law and Mac Dermid (A-F). **Results** 106 references were included and recommendations were found the following with evidence The evidence is moderate to strong for identification of risk factors, clinical course, diagnosis/classification, and outcome measures. There is theoretical/foundational evidence for activity/participation levels and expert opinion for imaging. Conflicting evidence was found for interventions including the use of support belts, and exercise. The evidence for manual therapy can best be described as weak/emergent at this time. **Discussion - Conclusions** This CPG can be used to guide clinicians in their clinical reasoning processes in the examination and intervention of females with pre-natal pelvic girdle pain. The organization and classification of the document can guide research to address the paucity of evidence especially in the interventions with this population.

PL#27

DIFFERENTIAL DIAGNOSIS AND MANAGEMENT OF INTERMITTENT VASCULAR CLAUDICATION IN A 57 YEAR-OLD MALE

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Background & Purpose It is imperative to differentiate the source of lower extremity (LE) symptoms that present with low back pain for appropriate diagnosis and management. Causes of LE symptoms that may present concurrently with low back pain include neurogenic or vascular claudication, compartment syndrome or lumbar referred pain. This case report describes the differential diagnosis and management of a patient with intermittent vascular claudication. **Description** A 57 year-old male presented to Physical Therapy with a primary complaint of R leg pain with gradual onset over 1-2 months. Symptoms increased over the past week with increased walking at work. The patient had a secondary complaint of low back pain for the past 2 years. His medical history was significant for a cardiac bypass with bilateral femoral vein harvesting 10 years prior. One month prior to his Physical Therapy referral, his cardiologist cleared him to exercise. His primary complaint was numbness/tingling (P1) and cramping (P2) throughout the entire right leg. Low back pain (P3) was central, non-radiating over L4-S1, and described as intermittent and variable. The hip, knee, and ankle joints were cleared via squat, physiological and accessory motion testing. The lumbar spine was cleared with AROM/PROM in all planes and quadrant. Unilateral PA motions to R2 reproduced P3, and resolved within seconds after cessation of testing. Neurological examination was negative, as were the SLR test and Slump. Occlusion of the popliteal artery reproduced P1. Ankle Brachial Index (ABI) was assessed at 0.88. A bike test reproduced P1 at 5 min, which resolved after 3 minutes of rest. **Outcomes** The patient's LE symptoms were determined to be due to vascular claudication based on examination findings. A treatment plan was developed based on guidelines established by the American College of Sports Medicine. After 8 weeks of supervised exercise and regular follow-up with his cardiologist, the patient was able to walk continuously for 60 minutes with minimal symptoms in the leg and foot, and had an ABI improvement to 0.94. **Discussion - Conclusions** This case report illustrates the utility of a detailed physical examination for narrowing a differential diagnosis list and supporting the resultant hypothesis with an evidence-based treatment program. The physical examination utilized a manual therapist decision-making skillset to differentiate symptoms from articular, neurogenic and vascular sources allowing a specific graded exercise program for patient management.

PL#28

USE OF AN EVIDENCED BASED MULTIMODAL PHYSICAL THERAPY APPROACH INCLUDING MANIPULATION IN TREATMENT OF A PATIENT WITH COMPLEX REGIONAL PAIN SYNDROME

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Background & Purpose: Chronic regional pain syndrome (CRPS) is a complicated and poorly understood phenomenon with little information on appropriate physical therapy (PT) management. The purpose was to describe the effects of an evidenced-based multimodal treatment approach including peripheral and spinal manipulation in the treatment of patient with chronic CRPS. **Description** A 21-year-old female was initially diagnosed with partial gastrocnemius tear but subsequently developed CRPS. She presented with pain in the right lower extremity (LE), swelling, dystrophic changes, and inability to bear weight or walk w/o crutches even after 15 months. Her prior treatment consisted of PT (Edema control management, electrical stimulation with compression and elevation, tactile discrimination training, gradual weight bearing exercises, stretching and strengthening of lower extremity muscles), a lumbar sympathetic block, an epidural local anesthetic block and oral medication, which failed to resolve her symptoms. **METHODS**: PT treatment consisted of educating about chronic pain, graded motor imagery, graded activity exposure, strengthening, neurodynamic mobilization and manipulation to the ankle, knee, lumbar, and thoracic spine for 25 visits. Outcome measures included the Numerical Pain Rating Scale, Lower Extremity Functional Scale (LEFS), and Tampa Scale of Kinesiophobia (TSK) and were measured at - 0, 4, 8, 12, and 16 weeks. **Outcomes** She had clinically significant reductions in pain and kinesiophobia and increases in self-reported function by 16 weeks. Changes in outcome measures - 1) NPRS (0 week - 9/10, 16 week - 0-1/10), 2) LEFS (0 week - 18/80, 16 week - 74/80), and 3) TSK (0 week - 45/68, 16 week - 24/68). She was also able to return to running by 16 weeks. **Discussion - Conclusions** Theoretically-manipulation has neurophysiological effects that could potentially address the impairments associated with CRPS. This case report is the first study to report the effectiveness of manipulation in a patient diagnosed with CRPS.

PL#29

PROXIMAL TIBIO-FIBULAR JOINT AS A CAUSE OF LATERAL KNEE PAIN

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Background & Purpose Lateral knee pain can be attributable to altered arthrokinematics of several structures related to the site of pain. Dysfunction of the proximal tibiofibular joint may stress lateral knee structures that directly or indirectly support this joint. The proximal tibiofibular joint is not routinely assessed for dysfunction during a knee examination, potentially delaying resolution of lateral knee pain. This case study describes the examination and effect of addressing the proximal tibiofibular joint in a young lady with lateral knee pain. **Description** A 22-year-old food service employee presented with gradual onset lateral knee pain after working two 12-hour days approximately one month prior to physical therapy. Her job required fast paced walking, pivoting, and climbing stairs. She did not recall previous ankle injuries. She reported that the pain appeared to be extending up into the hip. A standard knee, hip and ankle examination was negative for pain provocation, motion loss or other deficits. Passive proximal tibiofibular joint mobility testing revealed a loss of motion of the joint and reproduced the patient's symptoms. **Outcomes** Treatment consisted of one proximal tibiofibular joint manipulation in an anterolateral direction, followed by taping to support the joint. At the second visit 7 days later she had no complaints of knee pain. She had been able to walk, run and work 6-hour shifts without any difficulty. At the third visit, 20 days after the initial visit, she remained pain free and had resumed all previous activities. She no longer had any complaints of hip pain. A Selective Functional Movement Assessment performed at this visit revealed a dysfunctional and mildly uncomfortable lumbar spine during multisegmental extension. She was discharged with a program of exercises to improve motor control, particularly during extension movements. **Discussion - Conclusions** Activities such as prolonged fast paced walking and pivoting may have altered the arthrokinematics of the proximal tibiofibular joint. These altered arthrokinematics of associated joints of the knee and stresses to the supporting structures may lend to development of a painful response. A detailed knee exam should address the proximal tibiofibular joint.

PL#30

A FUNCTIONAL MANUAL THERAPY APPROACH TO TREATING CHRONIC EXERTIONAL COMPARTMENT SYNDROME IN A TRIATHLETE

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Background & Purpose Chronic Exertional Compartment Syndrome (CECS) causes severe lower leg pain and leads to premature cessation of running activities. Inter-compartmental pressures (ICP) greater than 15mm mercury are diagnostic of CECS. The current available treatment for CECS is surgical intervention with no evidence supporting a conservative approach to treatment of this condition. The purpose was to present a conservative approach to the treatment of CECS through Functional Manual Therapy ™. **Description** The patient in this report is a 34 year-old competitive triathlete with resting ICP measures of 25mm-38mm. No post-exercise measures were taken initially due to the high pressures noted at rest. The primary intervention approach was based on Functional Manual Therapy ™ and aimed to correct myofascial, neuromuscular, and motor control deficits in the lower quadrant. **Outcomes** Following 14 weeks of intervention 1-2 x/week for a total of 23 sessions, ICP measures revealed a decrease in pressure in all compartments to 8-19 mm at rest and 11-22 mm post exercise, all considered within normal range. At time of discharge, the patient resumed training for an Olympic Triathlon, cycling and running with no pain, and complaints of only minimal post exercise tightness in his calves. In addition, LEFS scores improved from 62/80 to 80/80. **Discussion - Conclusions** The opportunity for patients suffering from CECS to be treated successfully utilizing a non-operative approach of FMT is highly desirable. To the author's knowledge, this is the first documented case in which resting and post exertional compartment pressures dropped into the normal range.

PL#31

VALIDATION OF THE LATERAL ANTERIOR DRAWER TEST FOR EXAMINING POSTERIOR CRUCIATE LIGAMENT INTEGRITY IN UNEMBALMED CADAVERIC KNEES

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Background & Purpose Clinicians are often unable to identify posterior cruciate ligament (PCL) ruptures through common clinical tests, lending to undetected tears and potential degenerative changes. The lateral-anterior drawer (LAD) test has been proposed but has not been validated for the diagnosis of PCL-ruptures. This test is distinguished by its lateral-anterior testing force direction. The purpose of this study was to assess the construct and concurrent validity of the LAD test. **Methods** Eighteen embalmed cadaveric knees (36-94 years old; mean = 79 years) were sectioned from pelvis to foot. With skin and subcutaneous tissue removed, threaded markers were inserted into the distal femur and proximal tibia. Each femur was stabilized and the tibia was translated in lateral-anterior direction for the LAD, versus straight posterior for the posterior sag sign (PSS). Each test was repeated three times with the PCL both intact and cut in that order. Digital images were captured at start and finish positions during each trial. Tibial marker translation during each trial was digitized using the Matlab Program (v. R2012b, The MathWorks, Inc; Natick, MS, USA) . Means and standard deviations were established for each condition. The PSS values were used as a reference standard for establishing LAD concurrent validity. **Results** Tibial translation was significantly greater with the PCL cut versus intact during the LAD ($t=-7.143$; $p<0.001$) and PSS ($t=-7.143$; $p<0.001$) tests. There was no significant difference between the change in tibial translation after the PCL was cut during the LAD versus PSS tests ($t=2.029$; $p=0.058$). Alpha level for all tests was set at $\alpha = 0.0167$. **Discussion - Conclusions** The LAD test detected changes in tibial translation corresponding with changes in PCL integrity, supporting test construct validity. The LAD test was at least as effective for assessing PCL integrity as the PSS test, supporting test concurrent validity. The use of the LAD test may be best suited when: (1) joint end-feel is important to the diagnosis; (2) increased muscle tone accompanies the knee injury and hinders an accurate PSS test use; and (3) Positive LAD and PSS tests can be clustered to strengthen PCL tear diagnostic suspicions.

PL#32

EXAMINATION OF CLINICIAN PERCEPTIONS FOLLOWING INTRODUCTORY CONTINUING EDUCATION INSTRUCTION ON TRIGGER POINT DRY NEEDLING

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Purpose Research has demonstrated that a 2-day (8 hours) of continuing education (CE) is insufficient in changing clinician behavior and patient outcomes.[1] This report demonstrates clinicians' perceived benefit of an introductory CE session on trigger point dry needling (TPDN). **Description** A 2.5-hour lecture/ 30-minute lab demonstration course focusing on an evidence-based approach for the safety, use, and effectiveness of TPDN was provided as part of a Texas Physical Therapy Association district CE series. Participants completed pre/post course surveys, including assessments of clinician perceptions of whether: 1) TPDN is a safe intervention, 2) TPDN is an effective intervention for musculoskeletal pain, 3) TPDN is an evidence-based intervention for musculoskeletal pain, and 4) if he/she would use TPDN in practice with proper training. 5-point scaled responses for each question included: completely agree, somewhat agree, neutral, somewhat disagree, and completely agree. Forty-three individuals completed the surveys (23 students, 20 clinicians). Of the clinicians, 65% (n=13) worked in outpatient orthopaedic settings, 65% (n=13) had 10+ yrs of clinical experience, and 20% (n=7) had DPT degrees. Wilcoxon Signed Ranks Test revealed significant improvements in pre- to post-scoring for clinician perceptions of safety, effectiveness, evidence support, and use of TPDN with proper training ($P<.001$ for all comparisons). **Summary of Use** Our results suggest that CE may positively impact clinicians' perceptions and likelihood of learning and using new clinical tools after obtaining proper training. Researchers should further investigate the impact of various types of education on clinician confidence, knowledge, and patient outcomes. 1. Cleland JA, Fritz JM, Brennan GP, Magel J. Does continuing education improve Physical Therapists' effectiveness in treating neck pain? A randomized clinical trial. Physical Therapy. 2009; 89(1): 38-47

PL#33

SURVEYS OF STUDENT CLINICAL EXPERIENCES WITH MANUAL EXAMINATION AND TREATMENT METHODS

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Background & Purpose The inclusion of the full spectrum of manual examination and treatment techniques, including thrust and non-thrust, is a curricular requirement by the Commission on Accreditation in Physical Therapy Education. For this skill to be the standard of entry-level clinicians, responsibilities exist for faculty of accredited curricula and clinical instructors of students. Anecdotal reports from students suggested the need to determine the extent to which student clinical experiences in manual therapy examination and treatment methods are consistent with curricular instruction and accreditation requirements. **Methods** Surveys were conducted of classes of students immediately following completion of their final clinical experiences of an accredited physical therapy program. A total of 416 students participated over nine consecutive years. These internships occurred over a wide geographic area of the US, representing student experiences in 29 states. **Results** Students reported diverse experiences in curricular concept reinforcement in their out-patient musculoskeletal care rotations. A total of 44.9% of respondents indicated their instructors used high velocity, low amplitude thrust techniques during patient care. Students reported 64.8% of their clinical instructors used and discussed evidence-based predictors of responses to manual therapy or clinical prediction rules. Particular manual therapy approaches were cited as superior by 33.5% of clinical instructors, but this proportion declined over the nine year interval. Among those most popularly cited were McKenzie, Maitland, and osteopathic approaches. A majority of clinical instructors used accessory motions in examination and treatment of patients. **Discussion - Conclusions** The heterogeneity of student exposures to manual therapy methods during clinical experiences, including those consistent with accreditation requirements placed upon educational programs, demonstrates the difficulty students may have in gaining adequate reinforcement and expansion upon classroom and laboratory instruction. Students may be challenged to achieve the basic competency level with manual therapy decision making and techniques expected as entry-level skills due to insufficient clinical education reinforcement. The presence of limited learning opportunities in the clinical setting for manual therapy procedures is problematic for a significant portion of new graduates entering the work force.

PL#34

TEACHING CLINICAL REASONING: AN INNOVATIVE AND FUNCTIONAL INSTRUCTION STRATEGY FOR EFFECTIVE STUDENT LEARNING, PATIENT MANAGEMENT, ASSESSMENT AND COMMUNICATION

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Purpose Teaching comprehensive, efficient clinical reasoning (CR) can be a significant challenge for both students and educators. An effective template that integrates the Patient Management Model with the Biopsychosocial Model was created to provide organized structure within which to learn CR. It uses familiar terminology and is less abstract than previously published CR algorithms. The purpose of this special interest report is to describe an innovative and well-received instructional model shown to facilitate CR. **Description** The instructional strategy consists of five CR categories - Biopsychosocial, Examination, Diagnosis, Prognosis and Intervention. These five "lines of thought" represent narrative, interactive, collaborative, ethical, procedural, diagnostic, predictive and teaching as reasoning. Students learn to evaluate patient history and test/measure data across all five lines of thought. Survey data gathered from Clinical Instructors indicate this model is a useful instructional and communication strategy appropriate for PT clinical education. Thirty-one CIs were queried using a 5-point Likert scale (1 = Strongly Agree, 5 = Strongly Disagree) to determine perceived usefulness. The mean ratings by CIs were: 1) usefulness to SPTs 1.7/5, 2) useful to own patient care 2.0/5, 3) useful as a CI 1.5/5. CIs disagreed with the statement that their professional training provided clear CR organization instruction rating this item 4.0/5. They disagreed with the statement that current published CR models are used regularly in clinical practice 4.4/5. Twenty-nine of the 31 CIs rated student who applied the strategy during internships as “above average”. SPTs stated their CIs were impressed with their CR ability and organization, and that the model provided useful organization to facilitate CR and communication. **Summary of Use** The model has been applied in PT education to

facilitate: 1) recall by providing effective organization to the CR process, 2) effective communication between SPTs, faculty and CIs, 3) efficient CR assessment, and 4) metacognition. Construct development requires effective conceptual organization, and this instructional model seems to provide a useful framework to organize CR processes used during patient management. Such structure has the potential to enhance learning comprehensive, efficient and sound CR to improve patient care. Survey results indicate potential value in post entry-level environments such as orthopedic residencies and clinical doctorate programs.

PL#35

ESTIMATED MINIMAL DETECTABLE CHANGE FOR THE KNEE OUTCOME SURVEY – ACTIVITIES OF DAILY LIVING IN PATIENTS FOLLOWING ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION

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Background & Purpose The Knee Outcome Survey – Activities of Daily Living (KOS-ADL) is a self-reported survey used to assess the effect of the patient's knee symptoms on their functional activities. Fourteen items are queried with a higher score indicating greater function. The maximum score is 70 points. The KOS-ADL has been suggested to be consistent, valid and responsive for knee dysfunctions. However, MDC has not yet been determined for ACLR. The purpose of the study was to estimate the minimal detectable change (MDC) for the KOS-ADL after anterior cruciate ligament reconstruction (ACLR) with or without other concurrent ipsilateral knee surgeries. **Study Design** Retrospective cohort study. **Methods** KOS-ADL was administered to all patients attending the post-operative ACLR group during Week 1 (range: 0.5-1.5 weeks), Week 4 (range: 3.5-4.5 weeks), Week 8 (range: 7.5-8.5 weeks) and Week 12 (range: 11.5-12.5 weeks). Any missing data was omitted from the calculations. MDC was calculated as 50% of the standard deviation (SD) of the between-weeks change score. **Results** Data from 147 patients (42 female; age 26.2±9.9 (SD) years) was available for analysis (all-ACLR; 160 change scores), including 69 patients without concomitant surgeries (ACLR-only; 78 change scores). For the all-ACLR cohort, mean change score from Week 4-1, Week 8-4, and Week 12-8 was 27.8±14.5, 10.3±10.4 and 4.4±5.7 respectively. Mean change in KOS-ADL score was 17.4 ±15.6. MDC for the all-ACLR cohort was 7.8 points. For the ACLR-only cohort, mean change score from Week 4-1, Week 8-4, and Week 12-8 was 30.1±13.8, 8.3±10.1 and 4.2±5.1 respectively. Mean change was 17.4±16.3. The MDC for the ACLR-only cohort was 8.1 points. **Discussion - Conclusions** The estimated MDC for patients after ACLR with or without other concurrent ipsilateral knee surgeries is about 8 points.

PL#36

EARLY RESULTS OF AN EVIDENCED-BASED REHABILITATION PROGRESSION FOR PATIENTS WITH HIP LABRAL TEARS: A CASE SERIES

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Background & Purpose Numerous studies document the effectiveness of a surgical approach in the treatment of patients with hip labral tears, but few have explored long-term non-surgical treatment for this patient population. The purpose of this study was to utilize an evidence-based multi-modal conservative treatment progression, to track the combination of self-report and physical performance outcomes of two patients with diagnosed acetabular labrum tears. **Description** Two patients with Magnetic Resonance Arthrography (MRA) confirmed hip labral tears were recruited for this study and followed throughout a period of approximately 6 months with outcomes assessed at baseline, 6, 12, and 24 weeks. The patients participated in evidence-based conservative care treatment progressions that were individualized depending on the impairments found at initial evaluation. Each treatment progression consisted of a multi-modal approach including manual therapy, muscular strengthening and neuromuscular reeducation and motor control activities. Tracked were self-report measures of pain and function, as well as physical performance on the Straight Leg Test and Step Down Test. **Outcomes** Both patients demonstrated a decrease in pain and improvements in functional disability as seen on the Visual Analog Scale (VAS) and the Hip Outcomes

Score (HOS), respectively. The patients also demonstrated increased strength in the Straight Leg Raise Test, and improved motor control during the Step Down Test. **Discussion - Conclusions** This case series suggests that conservative management of documented hip labral tears can result in positive outcomes and avoidance of surgical intervention. Treatment progressions should be patient-specific and address individualized impairments in order to maximize functional outcomes.

PL#37

EFFECTS OF NEURAL SLIDING & NEURAL TENSIONING TREATMENT FOR MEDIAN & ULNAR NERVES

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Background & Purpose There is little research investigating the relationship of sliding and tensioning of the nerve. The comparison of sliding and tensioning vs. mere tensioning treatment for the median and ulnar nerve is a valid focus of study. Our hypothesis states that neurodynamic dysfunction is more effectively treated with combined sliding and tensioning of the nerve than either sliding or tensioning alone. **Methods** Each subject completed the NDI and measurements were then taken for grip strength, pinch strength, and cervical ROM; and Median and Ulnar neural tension testing (NTT) was done. Subjects were randomly assigned into intervention groups. The three intervention groups were: sliding only, tensioning only, or a combination of neural sliding and tensioning, each session lasting 1 minute each. Subjects performed their assigned HEP twice daily for two weeks. After two weeks, subjects returned and completed another NDI all measurements repeated. **Results** A mixed-design repeated measures MANOVA was used to compare pre- and post-test measures of pinch strength, grip strength, cervical ROM, and shoulder/elbow ROM during NTT within all subjects and to compare the magnitude of these changes between the three treatment groups. The NDI showed a significant improvement from initial visit to the follow-up visit 2 weeks later at $p < 0.002$. 24 subjects exhibited the greatest dysfunction in the median nerve (11:sliding group; 7:tensioning group; 7:treatment group). ROM measured at the shoulder during the median NTT significantly improved at $p < 0.000$. 42 subjects exhibited the greatest dysfunction in the ulnar nerve (12:sliding group; 12:tensioning group; 18:combined treatment group). Grip strength improved significantly at $p < 0.000$ in all groups. Cervical ROM improved significantly at $p < 0.000$. There was no difference between groups with any of these measures. **Discussion - Conclusions** Intervention for neural tension dysfunction of the median and ulnar nerve has been shown to be effective whether utilizing sliding only, tensioning only, or a combination of sliding and tensioning. Since no difference was found between any of these groups, intervention involving sliding of the nerve only appears, at least in the short-term, to be just as effective in improving strength and mobility as a tensioning technique. Since tensioning by definition applies a greater load to the tissue, it would stand to reason that similar effects could be accomplished by applying less of a load to the tissue through a sliding intervention.

PL#38

THE ANATOMICAL RELATIONSHIP OF CARPAL BONES: A CADAVERIC INVESTIGATION

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Background & Purpose Performing a comprehensive examination of the wrist requires clinicians to orient to carpal structures. The capitate and lunate bones are difficult to palpate secondary to anatomical structure. A thorough knowledge of anatomical relationships must be employed. The purpose of this study was to identify anatomical relationships of carpal bones used to locate the capitate and lunate on the palmar aspect of the wrist on cadaveric specimens. **Methods** The authors evaluated the anatomical relationships of five methods for locating the capitate bone and two methods for locating lunate palmarly. Twenty-five (25) supine lying cadavers were examined. The overlying soft tissues were removed in order to expose the carpal bones. Metal markers were placed in the most prominent portion of scaphoid, trapezium tubercle, hook of the hamate, and pisiform, with additional markers placed in capitate and lunate. Fluoroscopy was used to image the wrist-hand complex allowing visualization of the anatomical relationships being investigated. **Results** Three of the studied methods for location of the capitate were shown to be viable

based on anatomical relationship. One of the studied methods for location of the lunate were shown to be viable based on anatomical relationship. **Discussion - Conclusions** The purpose of this study was to identify anatomical relationships of carpal bones to locate the capitate and lunate on the palmar aspect of the wrist on cadaveric specimens. The results from the present study provide information regarding the anatomical structures used localize capitate and lunate during surface palpation which is valuable during a clinical examination of the wrist and hand. Further research is needed to evaluate the reliability and accuracy of these methods for surface palpation with live patients. These studies will help clinicians maximize examination and treatment of carpal bone dysfunction.

PL#39

THE ADDITION OF THERAPEUTIC NEUROSCIENCE EDUCATION AND FUNCTIONAL DRY NEEDLING TO THE MULTIMODAL TREATMENT OF RECALCITRANT CERVICAL RADICULOPATHY

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Background & Purpose A small percentage of patients (pt) fail to respond to the typical evidence based multimodal treatment of cervical radiculopathy (CR). These patient may require additional treatment modalities beyond the standard treatment program (STP). The purpose of this case study is to suggest the addition of therapeutic neuroscience education (TNE) and functional dry needling (FDN) for patients with recalcitrant CR, which has not responded to the STP. **Description** A 37-year-old female pt presented to the clinic with 3-year history of diagnosis and treatment for CR with no reported effect. Treatment at previous base included right C5 microdiscectomy performed 2 years prior, and 1 month prior she completed a 6 month multimodal rehabilitation program including: manipulation/mobilization of the cervicothoracic spine, motor control/ROM exercises, and mechanical cervical traction, with no reported improvement. Evaluation of pt revealed the following: Patient taking tramadol and flexeril 3x per day; high Fear avoidance belief Questionnaire Physical Activities/Work (FABQ PA/W) and Neck disability Index (NDI) scores; multiple trigger point in right shoulder and cervicothoracic area; diminished sensation in the right C5 and 6 dermatomes; and positive (4/4) cervical radiculopathy CPR. TNE and FDN for the following structures: C4-T1 paraspinals, pectorlis minor, scalenes, and trapezius was added to the previous treatment program. **Outcomes** The patient was discharged after eight weeks with the following results: NDI score decreased from 54% to 16%, and FABQ PA/W scores decreased from 19/38 to 6/8; cervical ROM improved from right 48° and left 62° with radicular symptoms in right upper extremity during cervical movement, to 86° and 90° respectively without pain or radicular symptoms; was able to perform activities of daily living and normal work duties with a pain rating of no greater than a 1/10 with no radicular symptoms in her right upper extremity; and medication at discharge was Tylenol as needed. **Discussion - Conclusions** The addition of TNE and FDN of central and peripheral structures to an evidence based treatment program may be valuable in treating pts with recalcitrant CR. Further research is needed to define the role of these treatment modalities.

PL#40

CLINICAL REASONING IN A PATIENT WITH LEFT SHOULDER AND CERVICAL SPINE PAIN

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Background & Purpose Neck and shoulder pain are common complaints in orthopedic physical therapy clinics with several possible causes. This case describes the differential diagnosis and management of an atypical case of shoulder and neck pain. **Description** A 63-year-old male MD self referred to PT with primary complaints of left scapular, neck, and left shoulder pain at night and with tennis. PMH included cervical discectomy and fusion C3-C5 (2000) left shoulder impingement, and lumbar discectomy. Shoulder AROM showed a 10-degree pain free limitation in elevation. Shoulder PROM revealed mild loss of movement and pain at motion barrier. Left cervical quadrant testing reproduced left shoulder pain. Because his shoulder and cervical musculoskeletal exam was equivocal (not all his chief complaints were reproduced) the patient was asked to perform a modified Bruce protocol treadmill test. His scapular and shoulder pain was reproduced and were increasing. The test was stopped and he was referred to his

cardiologist. **Outcomes** At consultation, the cardiologist performed a stress echocardiogram and stress MRI that were equivocal. A subsequent cardiac catheterization revealed moderate high-grade occlusion of the left anterior descending artery. The cardiologist suggested a stent. The patient obtained two additional opinions which both advised management with Beta Blocker and Nitrates. Once his cardiac condition is reassessed and stable, he plans to return to address his musculoskeletal complaints. **Discussion - Conclusions** This case demonstrates a patient with pain complaints, which varied slightly in nature, occurred with the same activity and in the same location, but had multiple sources. His history of shoulder pathology contributed to his discomfort. Positive cervical spine testing pointed to referred pain. However, after careful history taking and attentive patient communication the PT to determined that multiple sources might be involved. While the patient had pain during the PT exam, it was not the exact pain he experienced playing tennis. Due to the equivocal nature of the musculoskeletal exam a modified Bruce protocol was performed. The left shoulder and scapular pain was reproduced and a decision was made to hold PT intervention until appropriate cardiac testing was completed. While not an acute emergency, a portion of the patient's pain was determined to be exertion related and appropriate cardiac treatment was completed.

PL#41

THE EFFECT OF SPINAL MOBILIZATION ON PAIN PRESSURE THRESHOLDS: A REVIEW OF THE LITERATURE

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Background & Purpose Spinal manipulative therapy (SMT) is a commonly used intervention employed by Physical Therapists for the treatment of pain and/or stiffness. SMT consists of both thrust (TM) and non-thrust mobilizations (NTM), with the main difference involving the force amplitude and velocity of force applied to the targeted vertebrae. Several studies have compared the effectiveness of TM versus NTM in the treatment of spinal pain, but the results have varied. This study was to systematically review randomized controlled trials assessing the hypoalgesic effects of a subset of NTM, on Pain Pressure Thresholds (PPTs). **Methods** A comprehensive search, with no language restriction, was conducted in the following databases: JOSPT, PubMed, Google Scholar, PTJ, CINAHLPlus with Full Text, OvidSP and PEDro from January 1998 until March 2013. The following text and key words were searched in various combinations as outlined in Figure 1: "pressure," "pain sensitivity," "pressure pain," "pressure pain threshold," "mobilization," and "manipulation." **Results** The initial electronic database search yielded a total of 6385 articles. After reviewing all titles for keywords and context, 1490 articles were selected for possible inclusion. After title duplications were removed, 135 article abstracts were screened, based on inclusion criteria. After full text examination 7 articles met the inclusion criteria and 2 were added from the hand search. The scores from the Risk of Bias Scores ranged from 5 to 11 out of a possible 12. **Discussion - Conclusions** The majority of the studies in this systematic review whose study participants were symptomatic had significantly increased PPT values after mobilizations were performed compared to the manual contact group. Our systematic review results suggest that spinal mobilization also has a favorable effect on increasing PPT, or reducing pain sensitivity when compared to control or placebo interventions.

PL#42

THORACIC SPINAL MANIPULATION FOR MUSCULOSKELETAL SHOULDER PAIN: CAN AN INSTRUCTIONAL SET CHANGE PATIENT EXPECTATION AND OUTCOME?

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Background & Purpose Thoracic high velocity low amplitude thrust manipulation (HVLATM) is an effective intervention for some patients suffering from musculoskeletal shoulder pain. The role of individual expectation in the treatment effectiveness has not been established. This study is a planned

secondary analysis of a randomized clinical trial. The purpose of the study is to examine: 1) if patients' expectations for treatment success changed as a result of a positive or neutral instructional set and 2) if a change existed, did it result in improved functional outcomes in response to HVLATM directed at the thoracic spine or scapula in patients seeking physical therapy for shoulder pain. **Methods** Subjects' expectations regarding the effectiveness of HVLATM on shoulder pain were recorded at baseline as either "Agree", "Don't know", or "Disagree". This was reassessed immediately following the provision of positive or neutral instructional set and viewing a video of the randomly assigned intervention (HVLATM directed at the thoracic spine or scapula). The subjects then received a thoracic or scapular HVLATM. The Shoulder Pain and Disability Index (SPADI) and the numeric pain rating scale (NPRS) were used as outcomes measures. **Results** Of the 44 subjects that received a positive message 11 (25%) had a positive expectation prior to receiving the message and 21 (48%) had a positive expectation following the message. The 10-subject change (23%) in positive expectation was statistically significant (p=0.019). The statistically significant shift of only 10 subjects left our study underpowered by 10 based on our *apriori* power analysis. There was no statistically significant difference in pain and function when those subjects whose expectations changed from "Don't Know" and "Disagree" to "Agree" were compared to all other subjects. **Discussion - Conclusions** Although patients' expectations of positive outcome following thoracic HVLATM significantly changed when providing a positive instructional set, these changes did not translate into clinically significant short term changes in shoulder pain and function.

PL#43

THE USE OF MODIFIED THORACIC MANIPULATION TECHNIQUES IN THE TREATMENT OF PATIENTS FOLLOWING ARTHROSCOPIC SHOULDER SURGERY: A CASE SERIES

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Purpose Thoracic manipulation is commonly performed for the treatment for shoulder pain. Thoracic manipulation has been shown to improve subjective pain ratings, range of motion, shoulder girdle force production, and functional outcome measures in patients with shoulder pain. This report describes modifications of thoracic spine techniques to allow safe manipulation of patients post-operative rotator cuff repair (RCR). **Description** Traditional thoracic manipulation techniques in the positions of sitting, supine and prone, have been successfully modified in the clinic to allow for comfortable positioning and protection of post-operative shoulders. A recent case series demonstrated significant improvements in pain level and functional outcomes in five patients status post arthroscopic RCR when thoracic manipulation was added to the traditional rehabilitation program. Measurements were taken at the initial examination and at 12 weeks. NPRS scores decreased by a mean of 4.1 points (MCID 2.17) and patients demonstrated a 50 point change in the QuickDASH (MCID 8). A Wilcoxon sign ranks was performed to compare scores at the evaluation and 12 week follow up visit. There was a statistically significant change in the NPRS (p=0.04) and the QuickDASH (p=0.03). This presentation will also provide the participant with diagrams and explanations for the modifications used in the case series. **Summary of Use** This report demonstrates modified manipulation techniques for the upper thoracic spine in three positions. Simple modifications of traditional thoracic manipulations would provide the manual therapist with safe alternatives to traditional manipulation techniques to decrease shoulder pain and improve functional movement patterns in patients status post shoulder surgery.

PL#44

CLINICAL DECISION MAKING UTILIZING TREATMENT OF THORACOLUMBAR JUNTION FOR ABDOMINAL STRAIN

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Background & Purpose Lateral abdominal wall injury is reported as part of "side strain syndrome" in sporting activities. There is little information about this lesion outside of sports medicine literature. Internal oblique innervation includes T6-L1 spinal levels. There does not appear to be literature describing treatment of this injury directed at the spine. The purpose of this case report is to describe the clinical decision making process, based on application of muscle spinal level innervations, to diagnose a young

female with suspected internal oblique strain and ipsilateral low back pain with treatment directed to the spine to create clinical effects on muscular symptoms. **Description** The patient was a 24 year-old female referred to physical therapy with insidious onset of localized right lateral abdominal pain 18 months prior. Symptoms were a constant, progressively worsening pulling, tightness, and aching pain in right lateral abdominal wall. Patient's medical history included four surgeries for left Legge-Calve-Perthes, right abdominal hernia surgery, chronic constipation and lower abdominal cramping onset June 2012, and left ovarian cyst laproscopic removal February 2013. This patient's comparable signs for right lateral abdominal pain and right low back pain included lumbar extension with right hip extension and gait. She received 4 treatment sessions over 11 days directed towards thoracolumbar junction and right lumbar levels of L1-3 due to corresponding innervations of internal oblique and psoas muscles, and therapeutic exercise of psoas retraining, hip abductor and extensor strengthening, and core stabilization. **Outcomes** Patient's comparable signs of lumbar extension with right hip extension improved 20 degrees and gait improved from 30 seconds symptom free ambulation to 15 minutes. Subjective pain report decreased from 7/10 to 0/10 pain. Functional outcome scores of Care Connections Lumbar Functional Scale improved 20 points in 10 days (MCID: 7 points) and Patient Specific Functional Scale improved 5 points in ambulation goal of walking at 4.2 mph (MCID: 3 points). **Discussion - Conclusions** This case supports treatment directed at corresponding spine levels based on innervations of involved muscles when dysfunction is present and corresponds to pain patterns. This highlights clinical decision making regarding treatment based on pain location directed at the thoracolumbar junction and right sided upper lumbar spine to address abdominal and psoas musculature dysfunction resulting in functional improvements.

PL#45

INCORPORATION OF SCAPULOTHORACIC AND THORACIC SPINE MANIPULATION IN THE MANAGEMENT OF A PATIENT FOLLOWING TRAUMATIC SHOULDER DISLOCATION: A CASE REPORT

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Background & Purpose Traumatic shoulder dislocation is a common medical diagnosis for which patients seek physical therapy care. A shoulder dislocation may result in damage of anatomical structures resulting in altered movement patterns of the shoulder complex and adjacent regions. This case report demonstrates how patient impairments, regional interdependence principles and best research evidence were used in clinical decision making in the management of a patient following traumatic shoulder dislocation. **Description** The patient was a healthy 21-year-old female who presented to physical therapy six days post-traumatic shoulder dislocation with relocation. She presented with impairments of right shoulder pain, postural dysfunction, decreased right shoulder AROM, strength and joint mobility resulting in decreased functional ability of the right upper extremity for daily activities. Initial physical therapy interventions were primarily based on post-dislocation protocol. After four physical therapy treatments patient made incremental gains with decreased pain and improved function. Based on continued patient impairments, clinical reasoning, and patient preference scapulothoracic and thoracic manipulation were incorporated into patient management. **Outcomes** A dramatic change in function and decreased pain was noted after the fourth visit in which manipulation techniques to the scapulothoracic region were incorporated into patient management. Following ten treatment sessions over approximately seven weeks the patient reported a global rate of change (GROC) of +7, Quick DASH from 68.18 to 2.27, and NPRS to 0/10 (Initially: 4/10 at best). **Discussion - Conclusions** This case study demonstrates positive outcomes following integration of orthopedic manual therapy targeting the thoracic spine and scapulothoracic complex in the management of a patient following traumatic shoulder dislocation.

PL#46

EFFECTS OF THORACOLUMBAR MANIPULATION ON CLUB HEAD VELOCITY IN RECREATIONAL GOLFERS

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Background & Purpose Increased club head velocity (CHV) has been correlated with lower golf handicaps and improved golf performance but there is limited research to date on the effects of thoracolumbar manipulation on club head velocity. The purpose of this study is to determine the effect of thoracolumbar manipulation on club head velocity in recreational golfers. **Methods** Recreational golfers age 18 – 55 without contraindications to manipulative intervention and no previous history of spinal surgery were included in this study. All subjects performed a standardized warm up including dynamic stretching and 10 practice shots. CHV was measured before and immediately after administration of a manipulative intervention to the thoracolumbar spine. **Results** Data collection is in process at the time of submission deadline. **Discussion - Conclusions** Researchers hypothesize that thoracolumbar manipulation could facilitate improved strength, mobility, and/or motor function that may improve club head velocity and result in lower golf handicaps and improved overall golf performance.

Abstracts Selected for Poster Presentations

PO#01
SPINAL MANIPULATION: COMPARATIVE ANALYSIS OF VARIOUS TECHNIQUES AND PHILOSOPHIES
Richard A. Hills
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Purpose To present for discussion and demonstration the various techniques and philosophies related to spinal manipulative therapy. **Description** An over view and summary of the foundational biomechanical aspects of the major spinal manipulative (thrust) techniques and their associated philosophies related to therapeutic effects and benefits, including several physical therapy techniques, osteopathic and chiropractic techniques. Comparing and contrasting the techniques theories, biomechanical analysis and practical demonstration. **Summary of Use** As the literature and evidence continues to mount regarding the efficacy of spinal manipulative therapy in the non-surgical management and treatment of spinal pain disorders, a clear understanding of the biomechanics, therapeutic effects and benefits, the potential side effects and adverse reactions of the various techniques and approaches used through out the health care community will become increasingly important in order to assist in spinal manipulative therapy technique selection and use by the individual practitioner. An understanding of the multiple approaches will help the provider in the development of competency and expertise, ultimately benefiting the patient by providing safe and effective manual therapy.

PO#02
DOES MANUAL THERAPY MAKE STRETCHING MORE EFFECTIVE IN THE GASTROCNEMIUS SOLEUS COMPLEX
Melissa Tatman, Mitchell Selhorst
Sports Physical Therapy, Nationwide Childrens Hospital, Columbus, Ohio, United States

Background & Purpose Excessive dynamic knee valgus with activity is a common cause of lower extremity injury. Decreased weight bearing [WB] dorsiflexion motion is associated with excessive knee valgus during weight bearing activity. Static stretching of the gastrocnemius and soleus complex produces minimal improvements and is not likely to significantly increase the flexibility of these muscles over the normal course of physical therapy. **Purpose:** To assess if a talocrural manipulation [TCM] or Instrument Assisted Soft Tissue Mobilization [IASTM] + stretching will produce superior results over static stretching alone. **Methods:** A convenient sample of 20 subjects with 40 healthy ankle joints but restricted WB dorsiflexion. **Intervention:** Subjects were randomly assigned to receive either TCM or IASTM on 1 ankle, the other ankle was the control. The ankle to receive intervention was determined by coin flip. Manual therapy was performed at initial visit and 2 day follow up. Subjects performed daily static stretches bilaterally on the gastrocnemius soleus complex. **Measures:** WB gastrocnemius and soleus measures were taken using a digital inclinometer at Pre-treatment, Post-treatment, 2 day, and 2 week follow up. **Results** 40 ankles were analyzed with no subjects lost to follow up. No group demonstrated clinical significant improvement during the 2-week follow-up period. The gastrocnemius group increased 2.31

degrees (95% CI 1.29, 3.33) over time. The soleus group increased by 1.45 degrees (95% CI 0.57, 2.36) over time. There were no significant differences between treatment groups. There was a trend to suggest that the TCM may be beneficial. The TCM group increased 2.77 degrees (95% CI 1.04, 4.51) while the gastrocnemius control group improved 1.60 degrees (95% CI 0.25, 2.95) at 2-week follow-up.
Discussion - Conclusions Manual therapy and static stretching of the gastrocnemius soleus complex did not result in clinically significant improvements in flexibility. Manipulation shows a trend for improving flexibility when combined with stretching. Additional research needs to be done to further examine this trend with more effective stretching interventions.

~~**PO#03**~~ **CANCELED**

~~THE ROLE OF VISION AND OBSERVATION IN REHABILITATION: WHAT WE'RE SEEING~~

~~Mark Powers,[1] Joseph Brence[2]~~
~~[1]Spine & Sport, Savannah, Georgia, United States, [2]NxtGen Institute of Physical Therapy, Atlanta, Georgia, United States~~

~~The role of vision and observation in Physical Therapy practice is potentially an underutilized variable that may significantly impact outcomes (influencing how one moves). Although common conditions treated by Physical Therapists vary in symptomatology, the patient often presents with altered motor control. When one has altered motor control, it has been speculated that "seeing" may result in "mirroring", therefore altering how one may potentially move. This occurs through a complex neural network of preparing and planning within the brain, resulting in a different formulated plan of executed movement. The principle driver behind observational learning is likely the mirror neuron system. This presentation will aim to explain the role mirror neurons play in observation, as well as describe the effects of decreased movement on cortical representation in the brain. *When considering the role of the mirror neuron system and power of observation, it is practical to think that observation has the potential to be a key player in the rehabilitation process due to the ability to begin motor planning of a movement before execution of the movement.*~~

~~**PO#04**~~ **CANCELED**

~~PROXIMAL TIBIOFIBULAR JOINT MOBILIZATION WITH KNEE INSTABILITY: A CASE REPORT~~

~~Kelsey Koenig, Tina Howell~~
~~Performance Physical Therapy, Bettendorf, Iowa, United States~~

~~**Background & Purpose** Current research for knee mobilization treatment is largely focused on joint mobility of the tibiofemoral and patella femoral joint to allow for pain-free movement of the knee. A limited amount of research addresses the tibiofibular joint. The purpose of this is case report is to address the importance of the tibiofemoral joint as part of a knee assessment especially when an individual presents with tibiofemoral knee instability. The researchers hope to demonstrate that manual therapy to ensure proper knee joint mechanics prior to implementing a strength and stability program may increase patient's recovery after an injury causing tibiofemoral instability. **Description** A 28 year old female was participating in an exercise class and jumping maneuver off a 6 inch step. Immediately upon landing she reported feeling her knee hyperextend and immediate pain ensued. Physical examination of the affected joint revealed hyperextension with passive range of motion the tibiofemoral joint accompanied by hypomobility of the tibiofibular joint. Further examination demonstrated that the patient did not endure a ligament, muscle injury, or a decrease in active range of motion. The patient was treated successfully with manual therapy and knee stabilization exercises. **Outcomes** Following treatment of the proximal tibiofibular joint with manual therapy to improve gapping, the patient was able to successfully return to participating in jumping and running activities without pain. **Discussion - Conclusions** Manual therapy mobilization of the proximal tibiofibular joint improved the patient's recovery rate and ability to return to her prior level of activity without pain.~~

PO#05

KINEMATICS REPRODUCIBILITY OF THE UPPER CERVICAL SPINE MANIPULATION USING CONTINUOUS MOTION TRACKING

Pierre-Michel Dugailly[1], Stephane Sobczak[1], Benoît Beyer[1], Patrick Salvia[2], Marcel Rooze[2], Véronique Feipel[3]

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Background & Purpose Cervical spine manipulation has been widely analysed describing various kinematics parameters. However, measurements and reproducibility of regional or segmental motion is still lacking during manipulation. The purpose of this study is to assess the reproducibility of global and regional 3D kinematics during upper cervical spine (UCS) manipulation using continuous tracking motion. **Methods** 3 fresh cadavers were used to assess motion during UCS manipulation performed by three different practitioners on two separate days. Data were collected using an optoelectronic system (sampling freq: 200Hz). Kinematics was computed for the global head-trunk and the UCS motions as well as for the impulse phase. Root mean square error was measured to estimate motion reproducibility. **Results** Average angular displacements were 14±5°, 35±7° and 14±8° for the head-trunk motion and 10±5°, 30±5° and 6±4° at the UCS, for lateral bending, axial rotation and extension, respectively. For impulse phase, average ROM was close to 10° for axial rotation component while magnitudes were negligible for the other motion components. Reproducibility data (intra- and inter-operator) demonstrated average variations ranged from 1° to 6° depending on the motion component. **Discussion - Conclusions** Our findings emphasize the low magnitude of motion components especially for axial rotation during UCS manipulation. Reproducibility analysis provided consistency of 3D motion data for pre-manipulative positioning as well as for impulse phase. The kinematic characteristics of UCS manipulation might be considered for providing minimal clinical risks and side effects.

PO#06

LUMBAR SPINE HEIGHT CHANGES MEASUREMENTS USING DIAGNOSTIC ULTRASOUND: AN IN VITRO REALIABILITY AND VALIDATION STUDY

Stephane Sobczak[1], Pierre-Michel Dugailly[2], Kerry K. Gilbert[1], Hooper Troy L[1], Phillip Sizer[1], Roger C. James[1], Omer Matthijs[1], Jean-Michel Brismée[1]

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Background & Purpose A few methods exist to measure both intervertebral disc and lumbar spine height (LSH) variations. Clinicians generally assess disc hydration (increased trunk height) using stadiometry after either specific orthopaedic manual therapy (OMT) treatments or posture. Nevertheless, stadiometry cannot measure specific spine segment height changes. Diagnostic ultrasound (DUS) could be another option for measuring spinal segmental height changes and be easily used by clinicians. The purpose of the study was to assess (1) the reliability and validity of DUS, as compared to caliper, for measuring lumbar spinal inter segmental distance (ISD) and lumbar spine height (LSH) before and after lumbar spine mechanical traction. **Methods** Two fresh cadaveric lumbar spines (T10 to S3) were used. The first lumbar spine without its surrounding tissues was immersed into a mixture of gelatin and used to propose the mammillary processes as anatomical landmarks for establishing the intra/inter-rater reliability and validity of ISD and LSH measurements using DUS as compared to caliper. The second lumbar spine with all surrounding soft tissues was mounted on an MTS device and used to assess the intra/inter-rater reliability and accuracy of ISD and LSH changes following a standardized mechanical traction up to 1.20 cm. **Results** Mean Standard Error ranged from 0.01 to 0.02 and from 0.03 to 0.04 cm for ISDs and LSHs, respectively. Mean Root Mean Square ranged from 1.6 to 6.8 % and from 1 to 1.1 % for ISDs and LSHs, respectively and mean ICC ranged from 0.98 to 1 for LSH. During traction, mean lumbar spine height measurement change using DUS was 1.15 +/- 0.03 cm. Bland & Altman plots demonstrated confidence intervals included in the limits of agreement. Nevertheless, there were significant differences ($p<0.001$) for both ISD measurements and LSH between caliper and DUS measurements. **Discussion - Conclusions** DUS overestimated spinal distances of 5.5 ± 1.5 %. DUS is reliable and accurate for measuring intersegmental spinal distances and lumbar spine height. This technology could be used for measuring specifically the lumbar spine height change following specific care. *In vivo* experimentations are needed.

PO#07

A MULTI-MODAL APPROACH FOR THE TREATMENT OF INTERNAL SNAPPING HIP SYNDROME.

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Background & Purpose The purpose of this case study is to introduce a novel approach to treating a patient with internal snapping hip syndrome utilizing a multi-modal approach, which included a combination of manipulative therapy and core stability training to the lumbar spine. **Description** A 29 year-old female presented with failed conservative treatment. She had an 8-month history of constant, progressive right hip pain accompanied by audible "popping" during hip flexion to extension motions, and reproduction of familiar groin pain with unilateral posterior to anterior pressures to L2 and L3. On initial evaluation, she rated her pain as 6/10 on the NPRS and scored 60/80 on the Lower Extremity Functional Scale (LEFS). Interventions consisted of core stabilization and lumbar thrust manipulation to the effected spinal segments. **Outcomes** She reported less frequency of hip popping, pain decreased to 0/10, her LEFS score at discharge improved to 77/80, and both remained the same at the one month post-discharge follow up. She also reported a +3.5 on an 11 point Global Rating of Change (GROC) measure. **Discussion - Conclusions** Internal snapping hip syndrome is an uncommon diagnosis that has limited evidence supporting a gold standard of treatment. Current evidence suggests spinal manipulation can have a neurophysiologic effect distal to the segment treated. Therefore, incorporation of spinal manipulation and core stabilization should be considered when patients do not respond to traditional treatment. This case study appears to provide additional evidence to support the use of spinal manipulation to effect distal locations.

PO#08

SUCCESSFUL TREATMENT OUTCOME USING A MULTIMODAL REGIONAL INTERDEPENDENCE APPROACH FOR MYOFASCIAL KNEE PAIN

Matthew Vraa
Regis University Fellowship in Manual Therapy, Denver, Colorado, United States

Background & Purpose Understanding the concepts of referred pain and regional interdependence are critical skills necessary for physical therapists working as an autonomous practitioner. When previous courses of traditional physical therapy fail to show results, additional multimodal interventions such spinal and extremity manipulation, as well as trigger point dry needling (TDN) should be considered in the decision making process. This case study describes the successful outcomes achieved with a multimodal regional interdependence (MMRI) model for treating chronic myofascial knee pain. **Description** A 32 year-old male presented with nonspecific chronic pain in the left knee region, reduced function, and two previously failed courses of exercise and modality based physical therapy for a slip and fall work accident eight months previous. Baseline data showed deficits with reduced Range of Motion (ROM) by 20 degrees of flexion, average Numerical Pain Rating Scale (NPRS) 6-8/10, and functional limitations at home and work despite having a negative MRI for pathology. Initial intake five-item Patient Specific Functional Scale (PSFS) and Lower Extremity Functional Scale (LEFS) had score of 14/50 and 31/80 respectively. Five sessions over eight weeks of MMRI, which included TDN and manual therapy to the spine and extremity, along with therapeutic exercises helped restore lost function. **Outcomes** Reduced NPRS (0/10); improved outcome measures (ROM full, PSFS 47/50 and LEFS 70/80), and full, unrestricted return to work by discharge. **Discussion - Conclusions** Application of a MMRI model was instrumental for this patient, who had previously failed conservative physical therapy, successfully return to full work status.

PO#09

SINGLE SESSION MULTIMODAL APPROACH USED TO TREAT A PATIENT WITH KNEE PAIN AND UNDIAGNOSED ACUTE MENISCUS TEAR

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Background & Purpose Patients can present to physical therapy with pathoanatomical findings that are not correlated with their functional impairments. This patient case study describes how early access of a single episode of intervention using a multimodal regional interdependent (MMRI) approach improved

outcomes and functional levels prior to completion of a pre-scheduled MRI. **Description** A 33-year-old female tripped, twisting her left knee, and over the next hour reported vague knee pain and inability to fully flex the knee. She followed up with her physician in 24 hours and therapy three days later. The mechanism and chief complaint appeared consistent with a meniscus tear pathology, but due to the acuity of the injury, intolerance to special testing and patient anxiety, a clinical diagnosis could only be hypothesized. Additional screening showed spinal and lower extremity impairments, which were treated with MMRI and dry needling approaches, and showed immediate favorable results after a single session. **Outcomes** Intersession improvements included pain rating from 7/10 to 3/10, knee range from 25 degrees of flexion to 90 degrees, and quadriceps strength from 4/5 to 5/5. Patient-Specific Functional Scale was 8/50 at initial evaluation and 44/50 one week post initial evaluation with no pain. Patient received a T2 weighted MRI six days post evaluation that showed abnormal signaling and two 3 mm tears in the lateral meniscus, even though this client no longer reported functional deficits. **Discussion - Conclusions** Even with the findings of pathology, conservative MMRI measures were able to improve pain, strength and function.

PO#10

A MANUAL THERAPY AND BIOPSYCHOSOCIAL TREATMENT APPROACH LEADS TO THE REDUCTION OF FEAR-AVOIDANCE BELIEFS AND RAPID RETURN TO FUNCTION FOR OCCUPATIONALLY INJURED PATIENTS

Lucas Pratt
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Background & Purpose Fear-avoidance beliefs (FABs) are notions that patients have about how physical activity and work may negatively affect their pain. A significant amount of patients' disability and loss of work time is directly due to their FABs. There is a need for research of an innovative approach for patients with work-related spine injuries. The purpose of this report is to examine the effect of a manual therapy and biopsychosocial approach on patients with high FABs and disabilities due to occupational injuries. **Description** Over a three month period, five patients with acute to subacute lumbar and cervical spine occupational injuries and exceptionally high FABs and disability scores were identified. The patients were treated similarly over six visits each with a manual therapy and biopsychosocial model, which consisted of identifying the musculoskeletal cause of pain, manipulation of local and regional joint dysfunctions, therapeutic and functional exercises, and extensive patient education and empowerment. **Outcomes** Each patients' Fear Avoidance Belief Questionnaire, physical activity and work subscales (FABQPA, FABQW), Modified Oswestry Disability Questionnaire (MODQ), and Neck Disability Index (NDI) were taken at the initial evaluation and sixth visits. The average FABQPA reduced from 20.6/24 to 0.8/24; the average FABQW reduced from 29.2/42 to 6.4/42; the average MODQ reduced from 42.6% to 1.3% disability; the average NDI reduced from 64% to 4% disability. All five patients returned to full work duty and were released from medical care. **Discussion - Conclusions** These case results indicate that a manual therapy and biopsychosocial approach can significantly reduce FABs and disability and rapidly return patients to function.

PO#11

THE TREATMENT OF CERVICOGENIC HEADACHES AND CERVICAL WHIPLASH USING MANUAL PHYSICAL THERAPY AND SPECIFIC EXERCISES

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Concentra Physical Therapy, San Marcos, California, United States

Background & Purpose Cervical pain and cervicogenic headaches are common symptoms after sustaining whiplash trauma to the cervical spine, and often lead to fear avoidance beliefs and decreased function. The purpose of this report is to describe the effect of an intervention approach consisting of manual therapy techniques, specific exercises, and postural education on an individual who sustained a whiplash injury. **Description** The patient was a 33 year-old female who was involved in a MVA and sustained a whiplash injury. The patient reported 6/10 headache pain and 3/10 neck pain on the Numerical Pain Rating Scale (NPRS). The patient was treated 6 times over a 3-week period. Impairments of joint mobility, muscle function, and posture were identified. The treatment included joint manipulation of the subcranial, midcervical, and thoracic spine, neuromuscular retraining of the deep cervical flexors, and postural reeducation. **Outcomes** Outcome measures included the NPRS, the Neck Disability Index (NDI), and the

Fear Avoidance Belief Questionnaire, Physical Activity and Work (FABQ-PA and FABQ-W, respectively). Over six visits, the NDI improved from a 26% disability to a 6% disability; the FABQ-PA improved from 12 to 8; the FABQ-W improved from 18 to 12; and the NPRS for headache and cervical pain intensity decreased from 6/10 and 3/10 respectively, to 0/10. **Discussion - Conclusions** The interventions of joint manipulation, specific exercises to improve deep cervical flexor function, and postural education were found to be successful in quickly improving the function, reducing the impairments, and decreasing fear avoidance beliefs in a patient with cervicogenic headaches from a whiplash injury.

PO#12

COOKBOOK CARE OR HEURISTIC FRAMEWORK? THE DYNAMIC INTERPLAY BETWEEN CLINICAL PRACTICE GUIDELINES AND CLINICAL REASONING IN THE MANAGEMENT OF A PATIENT WITH UNILATERAL ANKLE SPRAIN.

Justin Fischer
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Background & Purpose Clinical practice guidelines (CPGs) serve as evidence based framework for physical therapy examination, evaluation, diagnosis, and intervention. The purpose of this case was to demonstrate the concurrent application of implementing the ankle stability and movement coordination CPGs along with skillful clinical judgment for physical therapy management of a patient with an acute unilateral ankle sprain. **Description** A 27 year old male with a 4-day history of left inversion-mechanism ankle sprain sustained while playing in a basketball game. Symptoms were dull pain at the left lateral malleolus and medial arch rated 8/10 at worst on the Numeric Pain Rating Scale (NPRS). Radiographs were negative for fracture. The patient reported 66% ability and 6% ability on the activities of daily living and sports subscales, respectively, of the Foot and Ankle Ability Measure (FAAM). **Outcomes** Treatment involved 4 sessions over 9 weeks. Manual therapy and therapeutic exercises were selected based on CPG recommendations, augmented by the clinician's judgment relating to emerging data from each session. The first two sessions involved graded manual techniques and initiation of strength and proprioception exercises in weight bearing. The second two sessions emphasized sport specific proprioception and strengthening. At discharge, patient ambulated without an assistive device, scored 100% on the FAAM-ADL subscale, scored 90% on the FAAM-Sports subscale, and reported 1/10 maximum pain on the NPRS. **Discussion - Conclusions** This case study highlights the importance of skillful clinical reasoning alongside application of evidence-based CPGs for the management of acute ankle sprains.

~~**PO#13**~~ **CANCELED**

~~APPLICATION OF CLUSTERING OF TESTS IN CLINICAL DIAGNOSIS OF ACUTE MENISCAL PATHOLOGY IN AN ADOLESCENT~~

~~Jamila Aberdeen~~
~~Temple University, Philadelphia, Pennsylvania, United States~~

~~**Background & Purpose** Diagnosis of meniscal pathology through history and physical examination data remains a challenge to clinicians. Several signs, symptoms and special tests have been purported to assist in making this clinical diagnosis. Recent evidence suggests that clustering of signs, symptoms and special tests results may improve clinical diagnostic accuracy of meniscal pathology. Five common diagnostic tests may be clustered to enhance post-test probability of identifying meniscal pathology. The five commons tests include: 1) patient history of mechanical catching/locking, 2) joint line tenderness, 3) pain with forced hyperextension, 4) pain with maximal passive knee flexion, and 5) pain/click with McMurray's test. If a patient presents with 3 or more positive findings, the specificity is greater than 90% that there is meniscal pathology. **Purpose:** To describe the application and clinical decision making of clustered findings to accurately diagnosis an acute meniscal lesion in an adolescent female patient. **Description** A 17-year-old female with seven-month history of anterior knee pain of insidious onset. With no known mechanism of injury she was initially diagnosed with bilateral patellofemoral pain syndrome. During the history, the patient indicated an episode of locking of her left knee, which is typically associated with meniscal pathology. Following this historical finding, application of the remaining cluster items commenced. She exhibited medial joint line tenderness, pain with forced hyperextension, pain with maximal passive knee flexion and a positive McMurray's test. **Outcomes** Based on five positive findings, there is a positive~~

likelihood ratio of 11.20 indicating a large shift in probability that meniscal pathology is present. She was referred to an orthopaedic surgeon for further evaluation. A MRI was performed revealing a medial meniscal tear. **Discussion - Conclusions** This case report illustrates the application and clinical decision making of clustering findings to enhance the diagnostic accuracy of meniscal pathology. To our knowledge, there is limited data on clustering findings in an adolescent population presenting with meniscal pathology. Further research is warranted to examine the usage of clustered findings in this population.

PO#14

CLINICAL DECISION MAKING WITH AN UNDIAGNOSED POST-TRAUMATIC OSTEOLYSIS OF THE DISTAL CLAVICLE

Lawrence Holmes, Anthony Cheung, Trisha Perry
Nova Medical Centers, Houston, Texas, United States

Background & Purpose Post-traumatic osteolysis of the distal clavicle should be considered as an acute injury of the shoulder. **Description** A 43-year-old male mechanic experienced sharp pain in his left shoulder while pulling a crowbar to move an engine. Initial x-rays four weeks post-injury were negative for a fracture or dislocation. Upon initial evaluation, pain was reported along the left acromioclavicular joint and anterior glenohumeral joint. Flexion and abduction ROM were limited due to pain. External and internal rotation ROM was normal with pain. Palpation revealed tenderness to the acromioclavicular joint, anterior glenohumeral joint, and the area of the RTC interval. Positive special tests included: Hawkins/Kennedy Impingement, Supraspinatus, Yergason's, Modified Yergason's, and Speed's. Negative special tests included: Drop Arm and O'Brien's. Normal mobility test for acromioclavicular joint shear test and glenohumeral joint load and shift. Manual muscle testing of flexion, abduction, and external rotation were weak and painful. **Outcomes** After three weeks of conservative management the patient presented with no subjective or objective progress. An MRI was recommended by the physical therapist and ordered by the physician. MRI revealed post-traumatic osteolysis of the left distal clavicle. **Discussion - Conclusions** The earliest radiographic findings of post-traumatic osteolysis may not occur until four weeks post-injury. Physical therapists should consider the rare condition of post-traumatic osteolysis of the distal clavicle when patients' symptoms and physical exams are not consistent with plain x-rays. A physical therapist can contribute to the promotion of the diagnostic pathway of discovering rare pathologies and avoidance of unnecessary and potentially harmful interventions.

PO#15

CLINICAL REASONING UTILIZING MAGNETIC RESONANCE IMAGING IN A PATIENT WITH SHOULDER PAIN

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Background & Purpose To discuss the role of magnetic resonance imaging (MR) of the rotator cuff in clinical decision making and determining conservative rehabilitation and prognosis of a patient with traumatic onset of shoulder weakness and pain.
Description The patient was a 47 year-old male presenting to physical therapy (PT) with a chief complaint of nondominant left shoulder pain after falling in a hockey game 3 weeks prior. He demonstrated significant weakness with shoulder external rotation and scapular plane elevation, graded as a 3-/5 with pain. The patient also displayed a positive drop arm test, a positive external rotation lag sign, and a positive empty can test. Reflexes, dermatomal and myotomal screen were negative. The patient was referred to his primary care physician for further workup to rule out a full-thickness rotator cuff (RC) tear. T1 and T2 weighted MR revealed tendinosis with partial-thickness tear of the supraspinatus and infraspinatus tendons with a degenerative tear of the left glenoid labrum superiorly posterior to the biceps labral attachment. No supraspinatus muscle atrophy or fatty infiltration was identified. Given the normal neurological findings and MR ruling out a full-thickness RC tear, the remaining differential diagnoses included pain inhibition and/or neuropraxia of the suprascapular nerve. A trial of PT was warranted with an initial focus on pain education, range of motion and isometric strengthening exercises while monitoring motor function of supraspinatus and infraspinatus. **Outcomes** Over the next two weeks there was gradual improvement in

external rotation, elevation and pain. After 14 weeks of PT, the patient demonstrated full AROM with pain only at extreme end ranges and strength within 10% of his contralateral shoulder. He was able to resume all previous activities. **Discussion - Conclusions** Despite a clinical presentation consistent with a full thickness rotator cuff tear, MR revealed a partial thickness tear of the supraspinatus and infraspinatus tendons with good muscle quality and a degenerative labral tear. RC and degenerative labral tears are common in asymptomatic individuals and may have been present prior to trauma. Electromyography (EMG) to rule out suprascapular neuropraxia was not initially indicated due to the patients consistently improving status and likelihood of false negative EMG results within 3-4 weeks of injury. Understanding the results of further medical testing assisted with appropriate clinical decision-making and successful patient outcome.

PO#16

RIGHT CEREBELLAR TUMOR IN A PATIENT REFERRED TO PHYSICAL THERAPY WITH NECK PAIN

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Background & Purpose Physical therapists' scope of practice requires recognition of red flags and medical referral of patients not appropriate for physical therapy treatment. The purpose of this case is to describe a patient presenting with neck pain who was later diagnosed with a right cerebellar mass. **Description** The patient was a 28-year-old male who presented with insidious onset of left sided upper cervical pain, headache and dizziness for eight months. The patient had a recent history of night sweats, nausea, vomiting and decreased appetite resulting in a 30-pound weight loss. He had recently been diagnosed and treated for H. Pylori infection resulting in these signs and symptoms subsiding. The patient's cervical spine radiographs showed no significant abnormality. On examination the patient was noted to have significant forward head posture, decreased thoracic spine joint play and increased soft tissue density in anterior and posterior cervical musculature. Myotomal, dermatomal and upper extremity deep tendon reflexes were normal. Upper cervical ligament testing, vertebral artery and vestibular screening were negative. Neck pain was worse with extension and rotation movements, which were limited. He was seen for three sessions with close monitoring and reported improvement in neck pain. At the fourth treatment session the patient reported returning symptoms of nausea and vomiting. In view of this and due to his recent medical history, treatment was discontinued, his primary care physician was notified of his status and he was referred for further medical work up and to a neurologist. **Outcomes** Subsequent magnetic resonance imaging showed a large intra-axial cystic mass arising from the cerebellar hemisphere, with brainstem compression and hydrocephalus. The patient was scheduled for surgical resection of the mass soon after diagnosis. **Discussion - Conclusions** The patient in this case presented with musculoskeletal impairments and some features of mechanical neck pain. However his history of recent weight loss, nausea, vomiting and night sweats were of concern and raised suspicion of serious pathology. This case highlights the importance of early identification of red flags and prompt medical referral, when serious pathology is suspected in patients presenting for physical therapy.

PO#17

PANCOAST TUMOR CONCEALED BY RADICULAR NECK PAIN

Matthew P. Anderson
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Background & Purpose Pancoast tumors account for 3-5% of all lung carcinomas. The 5-year survival of resected tumors varied from 26% to35%, and the 3-year survival has reached up to 40%. Diagnosis can be delayed, due to the common initial symptoms being present in the shoulder and/or cervical region. **Description** A 71 y/o male was referred to physical therapy with a diagnosis of neck pain and radicular arm pain. He complained of intermittent dull/ aching or sharp shooting pain in the neck and left anterior and lateral shoulder, with difficulty washing his back and combing his hair. He also complained of pain and difficulty with holding his head upright, tenderness of the upper trapezius and levator scapula, and cervicothoracic hypomobility. During 5 visits, the patient had functional and subjective improvements in

neck and shoulder motion, with manual therapy and exercise directed at the cervicothoracic region. At visit 6 the patient reported improvement in both neck symptoms and muscular pain. He reported that he was waking up in pain, with progressively worsening sweating. He had appetite loss, but forced himself to eat. PT suspected systemic pathology at this time. **Outcomes** PT referred the patient back to his PCP. Prior to the follow up visit, the patient entered the hospital with worsening L sided chest pain. CT performed and mass observed in L upper mediastinum (left subclavian artery compression)- nodule had increased in size. PET CT Scan revealed hypermetabolic activity at left upper lobe. Needle biopsy confirmed non-small cell carcinoma, poorly differentiated with features of squamos cell carcinoma. Tumor deemed to be inoperable by thoracic surgeon. Outpatient radiation and chemotherapy intervention was chosen. Follow up with patient revealed a complete abolition of his pain. **Discussion - Conclusions** Radicular neck and arm pain is a common complaint seen in physical therapy practice. Vigilance during the gathering and interpretation of subjective complaints is paramount to identification of possible systemic pathology. Awareness of uncommon problems, which can mimic common clinical syndromes, is helpful when deciding if a patient is in need of medical referral.

PO#18

MULTI-MODAL MANUAL PHYSICAL THERAPY INCLUDING TRIGGER POINT DRY NEEDLING FOR MANAGEMENT OF SPASMODIC TORTICOLLIS: A CASE STUDY.

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Background & Purpose Spasmodic Torticollis (ST) is a chronic neurological disorder characterized by involuntary contractions of the cervical musculature that lead to abnormal movements and postures of the head. The estimated prevalence of the disorder is 0.390% of the United States population (390 per 100,000). Most cases are of insidious onset and classified as primary torticollis. The average age of onset is 41. The most reported symptoms include neck pain, altered position of the head, shaking or jerking, and headaches. The most common treatments include oral medication, botulin injection, and physical therapy. **Description** Case one was a 60 year-old female, who worked as a cardiac catheterization nurse. She had an insidious onset of ST 6 years ago. Her symptoms worsened over that time period, with minimal response to botulin injections. Her chief complaints were persistent headaches, and left sided neck pain. Functional activity limitations included difficulty with: driving, computer work, and holding her head still for long periods. Case two was a 50 year-old male, involved in a MVC in 1996, resulting in a clavicle fracture. He developed secondary torticollis type symptoms, with >20 year history. He works as an FBI agent, and the ST limits his ability to run, perform physical fitness activity, and perform computer work. He has received 3 rounds of botulin injections with progressively higher doses, with minimal improvement. **Outcomes** Outcome measures used for the cases included the NPRS, NDI, and GROC. Patient one demonstrated statistically significant changes on the NPRS, NDI and GROC. Patient two demonstrated statistically significant change in the GROC. The NPRS decrease one point, and the NDI decreased by 8%. Both patients reported that they had significant improvement in the ability to use the computer. **Discussion - Conclusions** Despite some suggestion of physical therapy in practice guidelines for spasmodic torticollis, there is minimal literature on selection of physical therapy treatment or efficacy and none utilizing manual therapy. To our knowledge this is the first report of either TPDN or thrust manipulation utilized for this diagnosis. Given the failure of both these patients with other measures, multi-modal manual physical therapy should be considered in the management of patients with spasmodic torticollis.

PO#19

ADHESIVE CAPSULITIS: A CASE STUDY THAT SCRUTINIZES NATURAL PROGRESSION

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Background & Purpose There is a myriad of literature on adhesive capsulitis of the shoulder, yet a universally accepted diagnosis, prognosis, and treatment remain elusive. Limited evidence exists to support the use of joint mobilization to treat adhesive capsulitis and combined treatments have made it more difficult to interpret results. Studies on the natural progression of adhesive capsulitis often cite patient reports of subjective awareness rather than objective measures to demonstrate that adhesive capsulitis is

self-limiting. The aim of this study is to examine (1) the natural progression of adhesive capsulitis and (2) to suggest a protocol of joint mobilizations to be used in the treatment of adhesive capsulitis. **Description** Patient is a 64 year-old male with bilateral adhesive capsulitis. Onset of symptoms in the left shoulder was 15 years ago and in the right shoulder 1 year ago, with no history of prior treatment. Measures of pain (Numeric Pain Scale, NPS), function (Simple Shoulder Test, SST), and goniometric range of motion (flexion, IR, and ER) were taken. Joint mobilization alone was delivered 3 times a week for a total of 11 treatments to each shoulder. Initial mobilizations utilized were humeral head inferior glide, anterior glide, posterior glide and lateral distraction. Clavicular inferior glide, clavicular posterior glide, and scapular distraction were added as needed. **Outcomes** Initial measures of pain (NPS), function (SST), and ROM demonstrated limitations in the left shoulder suggesting that adhesive capsulitis does not resolve when left untreated. Initial measurements were: NPS: left 3, right 6; SST: left 8, right 8; Flexion: left 145°, right 140°; IR: left 60°, right 55°; ER: left 60°, right 50°. Measures after 4 weeks of treatment were: NPS: left 1, right 3; SST: left 11, right 10; Flexion: left 165°, right 158°; IR: left 90°, right 73°; ER: left 70°, right 87°. Results showed clinically significant improvement (change > 15%) in NPS (left 33.3%, right 50%), SST (left 37.5%, right 25%), and ROM (left IR 50%, ER 17%; right IR 33%, ER 74%) in both shoulders after 4 weeks. **Discussion - Conclusions** Joint mobilizations were shown to be an effective treatment to improve pain, function, and range of motion in this patient with bilateral adhesive capsulitis. The greatest improvements in SST scores and ROM were found in the left shoulder with onset of symptoms 15 years earlier. In this patient case, adhesive capsulitis was not self-limiting and was successfully treated even after 15 years of dysfunction.

PO#20

THE USE OF NONTHRUST THORACIC SPINAL MANIPULATIVE THERAPY FOR THE TREATMENT OF TRAUMATIC NECK AND SHOULDER PAIN IN AN ADOLESCENT SWIMMER: A CASE REPORT.

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Background & Purpose Traumatic neck and/or shoulder pain are common musculoskeletal conditions treated in a physical therapy setting. The use of thoracic manipulation has been shown to provide both symptom relief and movement impairment improvements within session as well as in the short-term for the adult population. Little evidence exists on the benefits of nonthrust thoracic manipulation for traumatic neck and shoulder pain in the adolescent population. **Description** A 12 year old female presented with the resent onset of severe neck and right shoulder pain status-post slip and fall on the pool deck two days prior. She was taken to an outpatient urgent care center the morning after falling and diagnosed with both cervical and right shoulder sprain/strains. On initial evaluation, the patient demonstrated significant limitations in right cervical rotation, right shoulder flexion and abduction. After ruling out more serious medical pathology, a physical therapy examination was performed and manual therapy interventions were deemed appropriate. Nonthrust thoracic manipulations were utilized to address the familiar provocation and hypomobility in the upper thoracic spine. Total treatments consisted of two sessions in which the nonthrust manipulations were applied. The patient was also given a home exercise program focusing on cervical and scapular stabilization. **Outcomes** Reassessment performed after initial treatment demonstrated significant increases in active cervical and right shoulder range of motion. Return to normal function including swimming at a compettive level was noted after the second session. **Discussion - Conclusions** This case report demonstrates the immediate benefits associated with nonthrust spinal manipulative therapy (SMT) in an adolescent swimmer with traumatic onset of neck and shoulder pain. The use of SMT enabled the patient to return to light swimming after one session and return to full competitive training after two sessions.

PO#21

TASK SPECIFIC TRAINING FOR COMPETITIVE BALLROOM DANCER WITH SPONDYLOLYSIS AND LOW BACK PAIN

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Background & Purpose LBP from spondylolisthesis is consistent with Treatment Based Classification (TBC) Stabilization due to impairments in mechanical and functional stability of the spine. Poor motor control of the lumbar spine is due to impaired function of the deep lumbar stabilizers. Retraining motor control is optimized by the use of task specific practice yet this is not often utilized by PTs treating patients with musculoskeletal disorders. The purpose of this case study is to illustrate the use of manual PT, task specific training, principles of motor learning, and exercises to decrease LBP and return the patient to ballroom dancing. **Description** A 25 yo ballroom dancer presented with 2 week history of LBP dancing. X-rays revealed bilateral L5 pars fracture with grade 1 spondylolisthesis. Exam findings included hyperlordotic posture with anterior pelvic tilt during dance. He had painful lumbar extension with motion testing. He had short hamstrings and hip flexors with increased stiffness, which prevented him from achieving proper extended leg technique during dance. Transverse abdominus (TrA) and Lumbar multifidi (LM) muscle performance was impaired R>L. Early interventions trained LM/TrA and included manual stretching. Exercise was progressed by shifting to task specific training with application of motor learning principles. Dance routines were broken into part-task and patient was educated in motor imagery for self-practice to decrease the hyperlordotic posture. Eventually, full task practice was used including progressing to full speed in the shoes used for competition. Anticipatory and reactive balance reactions were trained while optimizing control of the lumber spine. **Outcomes** Patient was seen for 9 visits in 4 weeks. At DC patient had 0/10 pain during a multi-day competition, improved technique and performance scores, and +6 on the GROC with normal muscle length and LM/TrA activation. **Discussion - Conclusions** This case demonstrates successful integration of task specific training to improve motor control into a lumbar stabilization and manual PT intervention. With spondylolisthesis, mechanical stability of the spine is compromised which intensifies the importance of neuromuscular control for functional lumbar stability. This data suggests that the application of task specific training, motor imagery, and other principles of motor learning combined with manual physical therapy should be considered to facilitate successful return to high level, competitive functional tasks.

PO#22

IMMEDIATE EFFECTS OF THORACIC THRUST MANIPULATION ON SHOULDER INTERNAL ROTATION RANGE OF MOTION IN A PATIENT WITH SUSPECTED ADHESIVE CAPSULITIS

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Background & Purpose Adhesive capsulitis is common shoulder condition seen in physical therapy practice. The use of thoracic spine thrust has been associated with improved pain and range of motion outcomes in patients with shoulder dysfunction, however, has not been extensively evaluated in patients with adhesive capsulitis. Therefore, the purpose of this case report is to describe the physical therapy management of a patient referred to physical therapy for adhesive capsulitis using thoracic spine thrust manipulation combined with exercise and patient education. **Description** The patient was a 64 year-old female with primary activity limitations of reaching overhead and reaching behind her back for dressing tasks. Upon initial examination the patient reported increased symptoms of pain in the shoulder combined with muscle guarding, decreased active and passive shoulder range of motion and decreased glenohumeral and scapulothoracic joint mobility in all planes. After 7 sessions of glenohumeral and scapulothoracic joint mobilizations, exercise, and patient education, the patient was continuing to have significant difficulty reaching behind her back for dressing tasks. A thoracic spine thrust manipulation was performed on visit 8 with immediate improvements measured for shoulder internal rotation (+14 degrees) and with functional reaching behind the back. **Outcomes** After 7 subsequent session of thoracic spine manipulation, the patient demonstrated improvements in pain intensity compared with the initial evaluation (3/10 to 0/10), range of motion (45 deg to 65 deg of internal rotation), and functional ability to reach behind her back for dressing. **Discussion - Conclusions** This case further supports the use of manual therapy targeting the thoracic spine for patients with shoulder impairments. Future studies are required to evaluate the effectiveness of this combined treatment approach prior to providing any clinical implications.

PO#23

UTILIZATION OF MANUAL THERAPY TECHNIQUES IN THE MANAGEMENT OF CERVICAL AND THORACIC PAIN DURING PREGNANCY

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Background & Purpose Back pain is a common occurrence during pregnancy affecting approximately 80% of all pregnant women. Currently there is little evidence on the clinical effectiveness of manual therapy for the treatment of cervical or thoracic pain during pregnancy. Common manual therapy interventions that have been shown to be effective in non-pregnant populations include spine thrust manipulation; however during pregnancy these techniques are not commonly used. The purpose of this case report was to describe the use of manual therapy interventions in the management of a pregnant patient with upper back pain. **Description** The patient was a 23 year-old female presenting to the clinic with primary symptoms of upper back pain. The patient reported her pain began insidiously 3 months prior during the second trimester of her first pregnancy. The patient reported that symptoms have started to affect her ability to walk, bend over and rotate her trunk. A thorough physical examination was performed in the upper spine. Outcome measures assessed at initial examination included: numeric pain rating scale (NPRS), Patient Specific Functional Scale (PSFS), Oswestry Disability Index (ODI), and Pain Catastrophizing Scale (PCS). Following the initial assessment, a clinical diagnosis of cervical facet and thoracic costo-transverse joint arthropathy was suspected. A plan of care was developed and included manual therapy targeting the thoracic and cervical spine joints and soft tissue to reduce pain, guarding and improve joint mobility. **Outcomes** The patient was seen for 5 visits over 3 weeks with follow-up one month later. NPRS scores improved from initial assessment (4/10) to visit 5 (0/10) and were maintained one month later. Similar improvements were also observed for PSFS (4.3 to 6.0 to 7.3) and ODI (44% to 34% to 28%) and PCS (29 to 12 to 9) scores during the same time periods. All outcome measure achieved reported minimally clinically important differences. **Discussion - Conclusions** Pregnancy may potentially lead to musculoskeletal system dysfunction, which provides a unique opportunity for physical therapists specializing in manual therapy. The use of manual therapy techniques in the treatment of pregnancy related back pain for this patient did not result in any adverse responses and may have been associated with observed beneficial clinical outcomes. Future studies are required to evaluate the clinical effectiveness of integrating manual therapy interventions for the treatment of musculoskeletal pain in pregnant women.

PO#24

MANUAL THERAPY IN THE MANAGEMENT OF A PATIENT WITH RECALCITRANT MORTON NEUROMA: A CASE REPORT

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Background & Purpose Morton's neuroma (MN) is a painful condition of the foot involving perineural/epineural fibrosis around a plantar digital nerve, although clinical features of MN are typically non-neuropathic in nature. Diagnosis is made through clinical examination, with painful weightbearing a salient feature. While management often includes orthotics, injections, and surgical excision, few studies have reported on the use of orthopedic manual physical therapy (OMPT) as an intervention. The purpose of this case is to describe the treatment of a patient with a painful MN utilizing manual therapy.
Description A 35 year-old female presented with painful MN previously unresponsive to shoewear modifications and injection. Her physician had recommended surgical excision. She reported "shocking nerve" pain with walking that could reach 6/10 in high-heeled shoes. No strength or balance deficits were found, and range of motion of lumbar spine, hips, knees, and rearfoot were all within normal limits and painfree with overpressure. Her sensation (static cutaneous mechanical detection) at her foot and toes was normal. Lower limb neuroprovocation testing was negative for symptoms. Intercuneiform, talonavicular, calcaneocuboid and intermetatarsal hypomobility was demonstrated on her affected side. OMPT treatment included high grade non-thrust talonavicular, intercuneiform, and intermetatarsal mobilizations, as well as cuboid whip thrust manipulations. She was educated on MN pathophysiology and the efficacy of manual therapy for pain. Over the course of 6 sessions, her pain with toe walking resolved but she had a feeling of asymmetry in the area of pain, which improved over an additional 6 visits of OMPT treatment.
Outcomes Pain with toe walking improved from 5/10 to 0/10, the lower extremity functional scale (LEFS) improved from 66/80 to 79/80, and the Foot and Ankle Ability Measure ADL and Sports subscales

improved from 62/84 to 82/84 and 21/32 to 32/32 respectively. Pressure pain thresholds at her plantar 3rd webspace improved from 233kPa to 426kPa, which was symmetrical to her contralateral limb. **Discussion - Conclusions** This case provides a description of a patient with MN who was successfully managed using an impairments-based approach to manual therapy. Currently no published cases or research exist describing OMPT management of MN. More research is needed to determine the efficacy of OMPT in this condition.

PO#25

MANAGEMENT OF A PATIENT WITH CHRONIC JAW PAIN USING GRADED MANUAL THERAPY AND MOBIZATION WITH MOVEMENT

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Background & Purpose Temporomandibular disorders (TMD) encompass a myriad of dysfunctions that can result in facial and jaw pain, jaw hypomobility, locking and noises, tinnitus, neck pain and widespread hyperalgesia, and are often related to trauma or orthodontic treatment. Studies examining orthopedic manual physical therapy (OMPT) treatment of TMD have focused on regional outcomes and do not report hypoalgesic effects beyond the head and neck. The purpose of this case is to describe the treatment of a patient with chronic irretractable jaw pain and a history of neck pain utilizing OMPT and complementary home exercises and to report the hypoalgesic changes observed. **Description** A 23yo female presented with a 10yr history of bilateral (B) jaw pain and tinnitus following orthodontic maxillary expansion and a 5yr history of intermittent neck pain. Her jaw pain restricted her eating habits, could reach 10/10 with locking and tightness, and lasted for hours after eating. An orofacial surgeon had recommended B mandibular osteotomy. Cervical range of motion reproduced her neck but not jaw pain. Her mouth opening (MO) was limited and painful. Anterior glides of her temporomandibular joints (TMJ) reproduced her jaw pain while posterior glides of her TMJs B reproduced upper cervical pain. Interestingly, unilateral posterior-to-anterior glides at her upper cervical spine also reproduced her jaw pain. Pressure pain thresholds (PPT) at her B masseters and thenar eminences were diminished. OMPT treatment included non-thrust mobilizations at her TMJs and cervical spine. Home exercises included self-mobilization of her TMJs and neck. In 6 sessions, her MO improved, pain resolved; and she could eat without pain. **Outcomes** MO improved from 30 to 45mm and average daily pain improved from 4/10 to 0/10. The jaw pain and function questionnaire improved from 16/52 tp 5/52. The Tampa scale of kinesiophobia-TMD improved from 55/72 to 39/72. PPTs at her right/left masseter and thenar eminence improved from 140/106kPa and 221/230kPa to 381/389kPA and 562/519kPa, respectively. **Discussion - Conclusions** This case described the successful treatment and reduction in distal hyperalgesia of a patient with chronic jaw and neck pain. OMPT directed at the cervical spine resulted in longer lasting effects in local and distal PPTs than OMPT at her TMJs. Currently, literature does not report changes in widespread hyperalgesia following OMPT treatment of TMD. More research is needed to determine the efficacy of OMPT on widespread hyperalgesia in this condition.

PO#26

EFFECTS OF MANUAL THERAPY IN COMBINATION WITH TRADITIONAL PHYSICAL THERAPY ON A POST-OPERATIVE DISTAL FIBULAR FRACTURE: A CASE STUDY

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Background & Purpose As the population of active aging adults rises, the prevalence of ankle fractures in this population increases. Current literature focuses on usage of manual therapy (MT), particularly with regard to Mobilizations with Movement (MWM), in patients with ankle sprains but not usage of MWM in chronic ankle fractures. The purpose of this case study is to observe the effects of MT (MWMs and manipulations) in combination with traditional physical therapy treatment on a chronic post-operative distal fibular fracture. **Description** The subject is a 52 year-old male 6 months status post open reduction internal fixation (ORIF) left lateral malleolus with syndesmosis screw. The patient's goal to return to work as a structural engineer requires adequate ankle range of motion (ROM) and balance. At initial evaluation subject presents with ankle pain, hyperalgesia, and decreased ROM, strength, and balance. The most

significant findings are lacking 5 degrees dorsiflexion (DF), inability to maintain single leg balance, and a FOTO score of 10 points indicating severe limitations in gait and function. During 10 visits over a 12-week period, treatment included MT (manipulations plus MWM) and exercises for balance and strengthening. **Outcomes** On the 10th visit, DF ROM improved from lacking 5° to 10° with complete resolution of hyperalgesia. Single leg balance improved to 36 seconds. His FOTO score increased to 56, indicating an improvement in overall function and gait. **Discussion - Conclusions** Mobilizations with Movement (MWM) and manipulation can be effective when used concurrently with traditional physical therapy for the treatment of a chronic post-operative distal fibular fracture.

PO#27

THORACIC MANIPULATION IN THE TREATMENT OF SPONDYLOLISTHESIS IN AN ADOLESCENT POPULATION

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Background & Purpose Spondylolisthesis is the most common form of low back pain in an adolescent population, especially in highly active patients. Spondylolisthesis is caused by repeated, forceful lumbar extension, and can result in a facture of the pars interarticularis. Grading of spondylolisthesis determined by the percentage of forward slippage of the vertebral body. Core stabilization exercises and soft tissue mobilization are the accepted conservative treatments. The purpose of this case series is to discuss the addition of thrust and non-thrust thoracic spine manipulation to decrease stresses on lumbar spine. **Description** 19 year-old female, collegiate water polo player, complaining of low back pain and radiating into bilateral lower extremities. Patient diagnosed with Grade 2 spondylolisthesis. 17 year-old male, high school basketball player, complaining of low back pain radiating into right buttocks, following acute hyperextension injury. Pt diagnosed with spondylolisthesis. Both patients presented with increased pain into lumbar extension, core and lower extremity weakness, and thoracolumbar junction hypomobility. **Outcomes** Patient 1: Modified ODI score 24% and NPRS 6/10 at evaluation. Patient 2: Modified ODI score 14% and NPRS 7/10 at evaluation. After 6 weeks of treatment, both patients were discharged with 0% disability on the Modified ODI, 0/10 pain and returned to athletic competition. **Discussion - Conclusions** Thrust and non-thrust thoracic manipulation may be an effective technique to augment successful treatment in the management of skeletally mature patients with spondylolisthesis.

PO#28

CERVICOTHORACIC JUNCTION THRUST MANIPULATION IN THE MULTIMODAL MANAGEMENT OF A PATIENT WITH TEMPOROMANDIBULAR DISORDER

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Background & Purpose The diagnosis, temporomandibular disorder (TMD), describes a number of pathologies in the craniofacial region. Clinical manifestation of TMD is variable, leading to a wide array of attempted treatment interventions. While a number of interventions exist, the evidence describing the efficacy of assessment and treatment of the cervicothoracic (CT) region for this patient population is sparse. The purpose of this case report is to describe the physical therapy management of a complex patient with TMD utilizing manual therapy, including CT junction thrust manipulation, education and exercise. **Description** A 46 year-old female presented to physical therapy with complaints of left sided jaw and facial pain for 6 months with insidious onset. A number of pain locations were reported, suggesting centrally mediated pain; however her jaw pain was the worst. Her medical history included fibromyalgia and clinical depression. Her dental history was unremarkable. Upon examination, the patient demonstrated a number of impairments of the jaw and cervicothoracic spine. Her primary signs and symptoms appeared consistent with left sided TMJ capsular dysfunction. However, given the patient's local symptom irritability, it was believed that treating remote sites initially would allow for more specific local treatment, in attempts to decrease pain and improve function. Interventions included thrust manipulation directed at the CT junction, in addition to local left TMJ mobilization, exercise, and patient education. **Outcomes** The patient was seen in physical therapy for 7 visits over 8 weeks with a two-month follow up. Neck disability index scores decreased from 34/50 to 16/50. Facial pain decreased from 9/10 to 5/10. Pressure pain

thresholds taken at the left masseter improved from 29.4 kPa to 107.9 kPa. Maximal jaw opening improved from 33mm to 45mm. The patient reported feeling quite a bit better, +5, on the global rating of change scale. **Discussion - Conclusions** Temporomandibular disorder can be a challenging condition to manage. Because of variable patient presentations, determining the most appropriate interventions for every patient is difficult. This case report describes the management of TMD utilizing CT junction thrust manipulation. It is the authors' hope that this report facilitates further research into the effectiveness of this cluster of interventions, while emphasizing the importance of assessing the cervicothoracic spine in patients with TMD.

PO#29

TIBIOFEMORAL MOBILIZATION AS AN ADJUNT TO ANKLE STRENGTHENING IN A PATIENT WITH MEDIAL ANKLE PAIN

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Background & Purpose A principle of orthopedic manual physical therapy is to investigate the involvement of joints that are proximal to the areas of a patient's reported symptoms. The purpose of this case report is to describe the clinical reasoning used in the selection of tibiofemoral joint mobilization as an adjunct to ankle strengthening in a patient with a diagnosis of "medial ankle pain". **Description** A 71 year-old female presented with a gradual onset of severe medial ankle pain affecting her gait pattern. She rated her pain as 8/10 on the Numeric Pain Rating Scale (NPRS), scored a 3.5 on the Patient Specific Functional Scale (PSFS), and quantified her walking tolerance at < 1 minute. Pain significantly affected her gait pattern and after being placed in a walking boot for 6 weeks she was referred to physical therapy. The physical therapy initial examination revealed bilateral pes planus and bilateral genu valgum. During gait analysis it was observed that the tibia appeared to be in external rotation and lateral translation during stance phase. On palpation there was pain posterior to the medial malleolus at the tibialis posterior and flexor digitorum longus tendons. Manual muscle testing revealed impaired strength with pain reproduction during testing of the tibialis posterior muscle. Knee examination revealed reduced joint mobility into tibial internal rotation and medial glide. It was hypothesized that observed tibial kinematics were due to medial arch collapse and altered tibiofemoral alignment. This finding, along with postural observation of the lower quarter, lead to treatment using tibial rotations and tibial lateral to medial glides to reduce knee joint hypomobility. **Outcomes** Treatment consisted of 5 sessions over 8 weeks. Therapeutic exercise included plantar flexion and inversion strengthening along with manual therapy techniques directed at the tibiofemoral joint including tibial rotations and medial glides. After treatment the patient reported an immediate decrease in static weight bearing pain and pain with ambulation. Treatment progressed to include hip strengthening exercises. At the fifth session she rated her pain as 0/10 on the NPRS and 10 on the PSFS with a tolerance to walking of 60 minutes. **Discussion - Conclusions** Considering the biomechanical and kinematic relationship between the knee and ankle, tibiofemoral joint mobilization may be indicated for patients who present with medial ankle pain.

PO#30

THERAPEUTIC NEUROSCIENCE EDUCATION AND ACTIVE EXERCISE FOR AN INDIVIDUAL WITH ACUTE NECK PAIN: CASE REPORT

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Background & Purpose Neck pain is a common disorder that generally has a favorable prognosis, however a percentage of patients develop chronic symptoms after the initial onset. Therapeutic neuroscience education (TNE) may potentially reduce the likelihood of developing persistent pain. The purpose of this case report is to present the outcomes of a patient with acute, traumatically induced neck pain utilizing traditional neck rehabilitation along with TNE. **Description** A 55-year-old female police officer presented with acute neck pain after a slip-and-fall incident at work. Based on the Neck Pain Treatment Based Classification, the patient was matched to the pain control subgroup. Physical therapy management consisted of active exercise augmented with TNE including verbal and video enhanced education. Primary outcomes tracked over time were: time to return to work, pain, and self-perceived

disability. **Outcomes** At initial evaluation, the Neck Disability Index (NDI) was 38%, average NPRS was 7/10, and Orebro Musculoskeletal Pain Questionnaire (OMPQ) was 74/100 indicating high risk for future work disability. The patient returned to work after ten sessions of physical therapy with a NDI score of 10% and reported feeling "A great deal better" (+6/7) according to the Global Rating of Change outcome measure. **Discussion - Conclusions** This patient presented with several risk factors for a poor prognosis. Causal conclusions cannot be drawn from a case report, but TNE combined with exercise may have assisted with her favorable outcome and return to work. Additional research is required to examine the effect and method of delivery of TNE for patients with acute neck pain.

~~**PO#31**~~ **CANCELED**

~~OUTCOMES FOLLOWING PHYSICAL THERAPY FOR A 14 YEAR OLD PATIENT WITH MULTIPLE COMPARTMENT SYNDROME~~

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~~**Background & Purpose** Acute compartment syndrome (ACS) is common following fractures, but is uncommon following cardiac procedures. The purpose is to 1) describe the orthopedic physical therapy management for a 14 year old patient diagnosed with multiple right lower extremity (RLE) compartment syndromes following cardiac surgery to repair a mitral valve defect, and 2) compare/contrast a DPT student physical therapist's clinical reasoning with that of an experienced clinical instructor. **Description** A 14 year-old female patient underwent a 20-week postoperative rehabilitation program emphasizing cardiovascular endurance, gait and therapeutic exercises to restore RLE function. The initial examination was completed by a licensed physical therapist with remaining treatments conducted by an experienced clinical instructor until the DPT student physical therapist became a part of the plan of care three weeks before the patient's discharge date. **Outcomes** The patient reported improved confidence with functional activities due to decreased pain from 4/10 ache in the right lateral foot to no pain, improved cardiovascular endurance, balance and ambulation, increased strength and increased PROM at the knee by 11% and at the ankle by 12% respectively. The initial evaluation should have included sensation testing and AROM of the RLE, static and dynamic balance, cardiopulmonary and psychological assessments in order to determine functional progression and to adequately prescribe interventions throughout the entire plan of care. **Discussion - Conclusions** This case report offers evidence supporting physical therapy intervention for patients with cardiac related ACS. Our profession is well positioned to lead the investigation into managing patients with this condition by making clinical decisions for appropriate interventions to use based on presenting impairments, functional limitations and disabilities. The move to the DPT as the entry-level degree in physical therapy brought added emphasis on clinical reasoning in PT curricula and accreditation standards. This case report supports the need for inclusion of effective clinical reasoning course work within physical therapy curricula and may indicate the need to offer clinical reasoning continuing education for experienced clinicians. Perhaps merging current clinical reasoning instructional design with clinical education and clinical research with dissemination of related evidence would enhance our recently updated APTA mission and improve our patients' quality of life.~~

PO#32

REGIONAL INTERDEPENDENCE IN A PATIENT WITH WHIPLASH AND TEMPOROMANDIBULAR JOINT DYSFUNCTION A RESIDENT CASE REPORT

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Background & Purpose Individuals with whiplash-associated disorders (WAD) may present with a variety of interacting symptoms related to the cervical spine and temporomandibular joint (TMJ) regions. These two regions are apparently inter-related through both biomechanical and neurophysiological mechanisms. The purpose of this case report is to describe the multi-modal management and outcomes of a patient with a WAD who presented with neck pain, headaches, and temporomandibular joint dysfunction (TMD). **Description** A 30 year-old female desk clerk presented to physical therapy 2 weeks post rear-end motor vehicle collision with complaints of cervical and thoracic pain, headaches, and painful jaw clicking. The patient presented with signs of both TMD and cervicogenic headaches including postural impairments,

cervico-scapular motor control deficits, jaw clicking with range restrictions and deviation, tenderness over the suboccipital and masseter regions, and referral of headache symptoms with posterior-anterior mobilization of C1-C4. The physical therapy intervention program included patient education, manual therapy and exercise interventions targeting her individual impairments. Manual therapy treatments consisted of thrust and non-thrust manipulation to the thoracic and cervical spine, TMJ non-thrust manipulation, and muscle relaxation techniques. Her exercise program included motor control and endurance training of the cervico-scapular region and TMJ specific exercises. **Outcomes** The patient was seen twice a week for 5 weeks and she reported a significant reduction in disability (Neck Disability Index at initial: 40%, 0% at visit 10) and pain (NPRS at initial: 5/10, 0/10 at visit 10). However, her jaw pain and clicking persisted warranting an additional 6 visits. At the end of the 3 additional weeks, her jaw pain and clicking were no longer present and the patient was discharged to an independent home program. **Discussion - Conclusions** The patient reported a reduction in symptoms and improvement in function following a multimodal treatment approach targeting the inter-related regions of the cervical spine and TMJ. Additional high quality research would assist in clarifying the relationship between the cervical spine and TMJ in addition to determining the most effective interventions for patients with concomitant headaches, neck pain, and TMD.

PO#33

ADDRESSING THE LUMBOPELVIC REGION IN A CASE OF ACUTE LATERAL KNEE PAIN PRESENTING AS A GRADE 1 LCL SPRAIN

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Background & Purpose Describe a case addressing acute lateral knee pain with treatment focused at the hip and lumbar spine guided by progressive functional testing resulting full resolution of symptoms. **Description** Patient was a 35 year-old female who participated in daily yoga activities. She was seen direct access one week following a fall from an inverted stance resulting in varus positioning of her R LE and immediate discomfort at the lateral tibiofemoral joint line. Past medical history was unremarkable for previous LE injuries. Exam of the R knee demonstrated reduced R knee flexion ROM with pain (R 145˚, L 155˚), patellar hypomobility, R hip ER ROM deficits (R 30˚, L 50˚) and R hip ER weakness per MMT. Pain was recreated with palpation (TTP) of the LCL and varus stress test at 0˚ / 30˚, with slight increase excursion at 30˚. Lateral step down testing (LSDT) and pigeon yoga positioning were utilized as functional pain provocation tests. Knee Outcome Survey for activities of daily living (KOS ADL) = 84%. Initial treatment addressing local mobility showed no change in LSDT (pre 70 deg/post 75 deg), an insignificant reduction in pain with pigeon position (pre 6/10, post 5/10) and no change in knee flexion ROM. Addressing hip ER ROM deficits resulted in improved R knee flexion ROM (155˚) and reduced symptoms during the step down test (90˚) and pigeon position (4/10) at initial evaluation. At second visit addressing noted asymmetrical lumbar side bending (R 25˚, L 40˚) through unilateral lumbar mobilizations and self side glide mobilizations resulted in normalization of side bending, improvement of R hip ER ROM, reduction of pain in pigeon positioning from a 4/10 to a 1/10, and improved LSDT from 90˚ to 125˚. Also there was a noted reduction in TTP at the R LCL per patient report. After four sessions over 3 weeks focusing treatment at the lumbar spine and hip, patient's R knee flexion ROM was symmetrical and painfree, she was no longer TTP to the R LCL, and both pigeon position and LSDT revealed 0/10 pain. KOS (ADL) scores showed normal daily function without pain (100 and patient subjectively reported full return to yoga participation and maintained this at 3 week follow up. **Outcomes** After four treatment sessions patient was able to return to sport on a daily basis with complete resolution of symptoms and was discharged. **Discussion - Conclusions** This case demonstrates the importance of functional testing and comprehensive examination to guide treatment choices, ultimately resulting in the full resolution of symptoms.

PO#34

INCENTIVE SPIROMETER OBSERVATION INVOLVING THRUST MANIPULATION AND SOMATIC RIB DYSFUNCTION: A CASE STUDY.

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Background & Purpose Incentive spirometry has been validated as a simple means of lung function and has been cited to be the most popular mechanical aid for encouraging lung volume (inspiratory capacity). Little is known about the orthopedic use of the incentive spirometer (IS) for examination and treatment. Despite a low prevalence of somatic rib dysfunction, somatic rib pain can have a high functional burden on patients and restrict respiration. This case report describes changes of IS volumes during management of a patient with a somatic rib dysfunction utilizing thrust manipulation. **Description** The patient was a 48-year-old female with 3 months of pain near the left scapula that extended to the upper left chest with deep breathing. Upper quadrant screening was negative for serious pathology. Physical therapy examination revealed a somatic dysfunction of the costovertebral and costotransverse (CV/CT) joint of the third rib. Thrust manipulation was indicated 2 times over the course of 4 visits. Trigger point dry needling, movement reeducation and use of an inspiratory muscle trainer were also involved in treatment. Inspiratory capacity, thoracic excursion, and the numeric pain rating scale (NPRS) were measured before and after each visit. **Outcomes** After four visits the patient's left scapula pain decreased from 7/10 to 0/10 on the NPRS and she reported no pain with breathing. The patient's anterior chest pain did not change until an inhalation thrust manipulation was aimed at the CV/CT joint of the third rib (a decrease of 2 points on the NPRS). Thoracic excursion improved 1.30 cm overall. Inspiratory capacity increased 1,125 mL overall, improving from 487 mL below to 638 mL above the patient's reference norm. **Discussion - Conclusions** The somatic rib dysfunction of the third CV/CT joint, restricting the patient's inspiration was supported by the patient's history, physical therapy examination, and response to treatment. Motion palpation and thrust manipulation targeting inhalation movement of the third rib appeared to be most beneficial in the management of this patient. All pre and post objective testing improved significantly over 4 visits. The IS may be a useful tool to allow further objectivity to an anatomical area (thorax) that is lacking outcome measures.

PO#35

PHYSICAL THERAPIST DIAGNOSIS AND TREATMENT MODIFICATION FOR HIP PAIN AND GLUTEUS MEDIUS DYSFUNCTION ASSOCIATED WITH LOW BACK PAIN AND SACROILITIS

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Background & Purpose Greater trochanteric pain syndrome (GTPS) has been reported to affect approximately 18% of elderly adults and is primarily diagnosed by clinical examination. Over-reliance on imaging findings has potential to bias the clinical diagnostic process, therefore frequent re-assessment including monitoring responses to treatment has been recommended as a method to determine the correct diagnosis. The purpose of this case report was to describe the differential diagnostic process involved with physical therapy management for a patient initially referred for low back pain and sacroilitis. **Description** The patient was a 67 year-old Caucasian female referred to outpatient physical therapy with primary symptoms of left posterior superior iliac spine and lateral hip pain for 5 months. An initial diagnosis of sacroiliac pain and lumbar facet arthropathy was suspected based on symptom location, pain with ipsilateral side-bending, positive spring testing and SIJ test cluster findings. Re-assessment at 2 weeks indicated a lack of improvement and possible misdiagnosis; therefore a shift in treatment was warranted to target suspected gluteus medius tendinopathy as part of GTPS with immediate positive treatment responses reported. Treatment included manual therapy (STM to gluteus medius, strain-counterstrain, hold-relax), exercises and functional training. Outcome measures included pain intensity (NPRS), low back pain related function (ODI), patient specific function, (PSFS), global rating of change (GROC), and physical performance testing that were assessed at initial assessment, during the episode of care (weeks 4, 7, and 14) and three weeks following discharge. Patient goals consisted of: (1) bending to tie her shoes without pain, (2) squatting ability, (3) balance, and (4) decreasing the amount of lost sleep per night. **Outcomes** Treatment consisted of 15 sessions over 14 weeks. Following 2-weeks of physical therapy, there were no changes in NPRS (6/10) or ODI (36%) scores. At 7 weeks (3-weeks following revised diagnosis), improvements in NPRS (6/10 to 0/10), ODI (36% to 24%) and PSFS (6 to 7.5) scores were reported with continual improvements at 14 weeks. **Discussion - Conclusions** Physical therapy management of musculoskeletal pain can potentially be improved when frequent re-assessment including monitoring responses to initial treatment is incorporated into clinical reasoning processes.

PO#36

PHYSICAL THERAPY MANAGEMENT POST ANKLE ARTHRODIASTASIS FOR OSTEOCHONDRAL DEFECT

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Background & Purpose Ankle arthrodesis is the surgical gold standard for osteochondral defect with OA. Ankle arthrodiastasis (AA)/distraction arthroplasty, considered a viable alternative to arthrodesis, has the advantage of increasing ROM and decreasing pain[2]. There is currently no literature on physical therapy (PT) management post AA. PURPOSE: To demonstrate a case of PT management post AA. **Description** A 51 y/o male s/p AA for osteochondral defect of the talus was examined and treated following 6wks of static distraction with an Ilizarov frame. He presented with substantial edema, generalized joint and soft tissue restriction, muscle weakness, tissue hypersensitivity, poor WB tolerance and low functional level (LEFS 14/80). Treatment progressed from aquatic to land-based therapy in three phases, based largely on tissue and patient response with reference to available literature on the surgical procedure. **Outcomes** The patient was treated x16 visits/8wks. He demonstrated clinically significant improvements in pain, ROM, dynamic stability and function (LEFS 52/80). Overall improvements in ankle DF(30^0), EV(20^0) & gt. toe Ext (75^0) were noted following specific joint mobilization techniques and lead to normalization of gait. **Discussion - Conclusions** PT following AA can pose some unique challenges to the clinician. This patient achieved good short-term outcome with a multi-modal approach including soft tissue and joint mobilization, ROM and stabilization exercises, NMR and functional progression, delivered on land and water in a graduated sequence. Aquatic therapy helped to decrease pain, hypersensitivity and edema, and facilitated WB tolerance in the early phase. Further research is needed to guide the clinician on the management of this patient population.

PO#37

DIFFERENTIAL DIAGNOSIS IN A PATIENT REFERRED TO PHYSICAL THERAPY FOR HIP AND LEG PAIN

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Background & Purpose The purpose of this case is to describe the importance of performing a thorough history, examination, and screen of all systems to differentially diagnose the cause of hip and leg pain. It highlights how systemic disease can mimic musculoskeletal problems. **Description** A 56-year-old male with insidious onset of hip and leg pain presented to physical therapy after referral from primary care physician and orthopedist. Previously, patient received physical therapy treatment for hip osteoarthritis that failed to relieve symptoms. Medical management included pain medications and corticosteroid injection neither of which provided long-term relief. At evaluation, he reported hip and thigh pain triggered by walking. Lumbar and neural screens were both negative. Review of systems revealed he was chronic smoker with extensive cardiac history. At third visit, patient performed stationary cycling test. Symptoms reproduced after three minutes and relieved with activity cessation. Peripheral pulses were diminished. Patient was referred back to physician for vascular workup due to symptoms consistent with peripheral claudication. **Outcomes** Following physical therapist recommendation, physician ordered ankle brachial pressure index test, which revealed moderate aorto-iliac arterial occlusive disease bilaterally. **Discussion - Conclusions** This case highlights the importance of continual consideration of non-musculoskeletal problems as the cause of symptoms. In this case, peripheral artery disease was masked as a musculoskeletal complaint. By using a thorough review of systems and sound clinical reasoning, a physical therapist is able to make a proper medical referral and request for additional testing to adequately diagnose the cause of hip and leg pain.

PO#38

A TAPING TECHNIQUE USED FOR TRIANGULAR FIBROCARTILAGE COMPLEX AND LUNATE LAXITY WITH ADJACENT HYPOMOBILITIES FOLLOWING A 5^{th} METACARPAL SURGICAL FIXATION: A CASE REPORT

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Background & Purpose Current research suggests that taping of a laxity may be used for sports participation, but has limited use for clinical treatment. The purpose is to present the physical therapist management of a patient S/P right hand 5th metacarpal fracture repair with associated soft tissue injuries, utilizing a taping technique and selective carpal joint mobilizations. **Description** The patient sustained a 2mm displaced fracture of the 5th metacarpal base, requiring surgical intervention. Following the 6 weeks of immobilization, the patient was referred to physical therapy. The exam identified a lunate laxity volarly, a laxity of the TFCC, pain with weight bearing, and weakness of grip strength. The UEFI indicated at 67/80 (16% disabled). **Outcomes** The outcomes of the patient were favorable over 5 treatment sessions. Only current limitation is discomfort (1/10 on VAS) with prolonged weight bearing wrist extension. The upper extremity functional index indicates at 79/80 (1% disabled). **Discussion - Conclusions** The authors theorized that adjacent hypomobilities further stressed the laxity. The use of the strapping tape allowed the patient to clinically stabilize the joint region while the treatment of the hypomobilities allowed for a reduction in the stress to the laxity.

PO#39

DIFFERENTIAL DIAGNOSIS AND MANAGEMENT IN A PATIENT WITH THE CHIEF COMPLAINT OF DYSPHAGIA: A CASE REPORT

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Background & Purpose Dysphagia is defined as difficulty swallowing, however it has also been described as a specific sensation of food being stuck in the throat or chest. People suffering from swallowing dysfunction experience a decreased quality of life and are more likely to suffer depression, malnutrition, and aspiration. To date, there has been no peer-reviewed literature suggesting the role of physical therapy in the management of a patient suffering from dysphagia despite its association with temporomandibular and cervical spine dysfunction. The purpose of this report is to review a physical therapy differential diagnostic process, to discuss a multidisciplinary approach to management, and propose a musculoskeletal hypothesis in a patient with the chief complaint of dysphagia. **Description** The patient was a 42-year-old female with 6-week history of difficulty swallowing and tightness in the jaw and throat. Multiple treatment attempts with other healthcare professionals had failed, and continued swallowing dysfunction led to significant weight loss. Right temporomandibular deviation with mouth opening, limited protrusion and hyoid hypomobility were found during objective examination. Of note, anterior cervical osteophytes were identified radiographically. Physical therapy management included soft tissue and joint mobilization to the craniofacial region, cervical spine, and hyoid bone. Further referral was made to speech language pathology. **Outcomes** Significant improvement was demonstrated on the Fear Avoidance Beliefs Questionnaire, the 20-item Jaw Functional Limitation Scale, the Global Rating of Change Scale, pressure pain threshold values, cervical spine and temporomandibular joint range of motion. **Discussion - Conclusions** In the presence of musculoskeletal impairments or complaints, the inclusion of physical therapy consultation in addition to speech language pathology, may be beneficial in the management of patients suffering from dysphagia, and was shown to have positive outcomes in this case.

PO#40

THE EFFECT OF A CONSTRUCTED LASERED-HELMET ON MOTOR CONTROL, PAIN, AND DISABILITY, AS MEASURED BY THE NECK DISABILITY INDEX (NDI) AND NUMERIC PAIN RATING SCALE (NPRS): A CASE STUDY

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Background & Purpose Current evidence suggests the lack of neck and upper quarter musculature strength, as well as decreased motor control of the DNF, are primary contributors to musculoskeletal neck pain. The Clinical Practice Guidelines for neck pain suggest use of coordination, strength, and endurance exercises for patients experiencing neck pain as a result of muscular weakness, decreased DNF endurance and lack of motor and postural control. The purpose of this case report is to describe the effect of a lasered-

helmet incorporated into a strength and coordination program to increase DNF strength and improve cervical motor control in order to decrease pain and improve quality of life. **Description** The patient was a 17-year-old high school band member referred with a diagnosis of neck pain. The patient reported a 4 month history of persistent symptoms, especially after band practice, which consisted of carrying a drum weighing 20-lbs around his neck. He reported only minimal, temporary relief using NSAIDs. No previous physical therapy management was reported before the current episode of care. The patient was seen for 7 visits over a 4-week period. Sessions 1-3 consisted of exercises for upper quarter, scapulothoracic, and deep neck flexor muscles **without** the use of the lasered-helmet. The subsequent treatment sessions consisted of the same treatment approach **with** the lasered- helmet incorporated into deep neck flexor exercises, along with postural and cervical control while drumming. Outcome measures used to assess patient's pain and level of disability are the ***Numeric Pain Rating Scale*** and ***Neck Disability Index.*** Meaningful clinically importance difference (MCID) for the NPRS and NDI are 2 points and 10 percentage points respectively. **Outcomes** Average NPRS and NDI for the first 3 treatments were 3.7 and 21% respectively and 0.25 and 9.5% for the last 4 sessions. The average NPRS and NDI scores exceeded the minimally clinical important difference (MCID) for each outcome measure indicating a patient-perceived important improvement in pain and function. **Discussion - Conclusions** Statistically significant and clinically meaningful improvements were observed in all outcome measures after the incorporation of the lasered-helmet. The patient's pain was eliminated and he was able to perform all daily and recreational activities symptom-free. This case study suggests that the use of a lasered-helmet incorporated into a strength and coordination program for neck pain can be used to reduce pain and improve function.

PO#41

WOULD LUMBOPELVIC MANIPULATION ALTER THE FATIGABILITY OF LUMBAR AND HIP MUSCLES IN A PATIENT WITH INTERMITTENT NON-SPECIFIC CHRONIC LOW BACK PAIN? A CASE STUDY

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Background & Purpose Back and hip muscles were found to fatigue faster in adults with chronic low back pain (CLBP) than in healthy adults. Research also has shown that neurophysiological functions of spine and extremity muscles can be altered with spinal manipulation. The purpose of this single case study was to describe the immediate and carry-over changes of the fatigability of the back and hip muscles of a woman with CLBP after application of a single lumbopelvic manipulation. **Description** A 34-year old woman presented with intermittent non-specific CLBP for 8 years on the center and right side of her lower back. The patient reported that she began experiencing a continuous low level of LBP approximately 2 days before she came to our laboratory. She rated her pain level at 2.4 on the Visual Analogue Scale (VAS). After a physical therapy examination, no neurological signs or contra-indications to spinal manipulation were noted. Muscle fatigability was determined using electromyographic (EMG) median frequency. EMG of her right lumbar multifidus (MULT) and right gluteus maximus (GMAX) muscles was recorded during a modified Sorensen's test. EMG of the right gluteus medius (GMED) muscle was recorded during a side-plank test. EMG and the VAS pain score were collected again immediately after a single lumbopelvic manipulation that was directed to her painful right side. EMG and the VAS score were collected once again at 1-week follow-up. **Outcomes** EMG median frequency showed muscle fatigue rate decreased in the right MULT muscle immediately after the manipulation (0.74%/s) and at the1-week follow-up (0.09%/s) from the baseline (0.87%/s) and in the right GMED muscle immediately after the manipulation (1.28%/s) and at the1-week follow-up (0.86%/s) from the baseline (1.50%/s). However, the fatigue rate increased in the right GMAX immediately after the manipulation (0.60%/s), but decreased slightly at the1-week follow-up (0.21%/s) from the baseline (0.31%/s). The VAS score decreased immediately after manipulation from 2.4 to 1.2, and was completely resolved at the 1-week follow-up. **Discussion - Conclusions** Lumbopelvic manipulation appears to decrease fatigability of the MULT and GMED muscles and pain level in this patient with intermittent CLBP. The results may indicate that improvement of muscle endurance is a potential benefit of lumbopelvic manipulation in patients with intermittent CLBP. A randomized clinical trial is planned to examine this effect in a larger population.

~~**PO#42**~~ **CANCELED**

DEEP VEIN THROMBOSIS AND PULMONARY EMBOLI IN A PATIENT SEEKING CARE FOR CALF AND RIB CAGE PAIN. THE SIGNIFCANCE OF THE SUBJECTIVE EXAMINATION: A CASE REPORT

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Background & Purpose Clinicians must be able to recognize when presenting signs and symptoms fall outside of a musculoskeletal etiology. The purpose of this case study is to highlight the significance of performing a thorough subjective examination, clinician's knowledge, the use of the Wells CPR, and importance of direct follow up with physician as this case evolved. **Description** Patient is a 48 year old female who had been working with her PCP and another PT for the past several months for complaints of "rib pain" and calf pain. The patient sought care with the author of this case study for calf swelling. A review of her history was not only significant for an overseas trip, but also for the use of birth control medication. There was no plausible mechanism of injury. Her objective exam was negative for Homan's and Rubor. 2+ pitting edema and unilateral LE edema scored a 2 on Well's Clinical Prediction Rules for DVT placing her at increased likelihood for DVT. A telephone call was made for referral and patient was advised on going directly to the ER for diagnostic testing. An US study was positive for an acute on chronic DVT of the popliteal vein. Upon diagnosis of DVT, the author of this study contacted patient to further question the nature of her previous "rib pain". Key findings on telephone interview included: improved but unresolved rib pain, no specific aggravating or alleviating factors, and the location of symptoms being in the anterolateral region of the rib cage (atypical for rib pain that is usually associated with costotransverse or costovertebral dysfunction). Suspicion was immediately raised for the possibility of PE as an alternative explanation for her ongoing "rib pain." Author contacted physician directly on phone and asked for additional work up. Physician consented despite initial reservation. **Outcomes** Follow up CT scan was significant for pulmonary emboli and a pulmonary infarct. Patient continued on Coumadin therapy, placed in a compression stocking, eventually taken off of hormone therapy, and was provided with options for follow up CT at 6 weeks. **Discussion – Conclusions** Even when working with patients who have seen their physicians, clinicians may need to further advocate for their patients, especially when potentially life-threatening pathology may exist. Unexplainable unilateral LE swelling, pain that did not match typical pain referral patterns for musculoskeletal etiology, and use of the Wells CPR were key factors in referring the patient back to physician.

PO#43

DIFFERENTIAL DIAGNOSIS AND TREATMENT OF C1 DYSFUNCTION: A CASE STUDY

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Background & Purpose Differential diagnosis of head and upper cervical spine pain is challenging due to the many structures and conditions that may cause pain in the area, as well as the overlap of pain impulses from the spinal trigeminal tract and C1-C3 nerve roots. The purpose of this case report was to describe a comprehensive regional approach to the examination of a patient presenting with facial and neck pain with associated headaches, and explore the contribution of the upper cervical spine and forward head posture. **Description** A 36 year-old female presented with an 18-month history of right-sided facial pain, frontal headaches, and upper trapezius tension. Although several health care professionals treated her for temporomandibular dysfunction, her symptoms persisted. A thorough history, and physical examination consisting of posture, temporomandibular joint, and cervical / upper cervical screening was performed leading to a diagnosis of C1 dysfunction with forward head posturing. Interventions included C1 and thoracic spinal mobilization, manipulation, and a home exercise program. **Outcomes** Outcome scores were obtained at the beginning of each session, with the amount of change between the initial and final treatment sessions being measured through utilization of the Numeric Pain Rating Scale (reduction of 2/10), Neck Disability Index (reduction of 18%), and Global Rating of Change (score of +3). **Discussion – Conclusions** C1 should be considered a potential contributing factor in patients presenting with pain in the head and neck region.

PO#44

MANAGEMENT OF A POSTERIOR CAPSULE RELATED EXTENSION LAG AND FLEXION LIMITATION FOLLOWING A TOTAL KNEE ARTHROPLASTY

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Background & Purpose With the projected growth in TKAs performed combined with the changing reimbursement environment, it will be important for PTs to achieve faster outcomes. CPM machines have been used to improve flexion after TKAs but the research does not support the benefit. Extension lags have been treated using weighted prone knee hangs which can cause more pain and reflexive hamstring activation which limits the effects. Also used are home stretching devices such as dynasplints which can be cumbersome and difficult for patients to relax and tolerate leading to non-compliance. This case study will give an alternative way to treat these limitations based on knowledge of histology, manual therapy and therex. **Description** 69 y/o male 9 days post-op TKA. Knee AROM 8-107 degrees. Flexion end-feel= sharp sudden arrest indicating scar tissue restriction. Covalent bonds begin to form after 3 weeks so AROM up to 110 degrees needed as quickly as possible. Interventions: Circular scar mobilization in the distal quad area to control random collagen formation, assisted lunges to align the collagen, and resisted leg press. Extension end feel= harsh resistance indicating the posterior capsule of the knee. To improve extension creep was used. Creep is a load that is applied to a tissue over a prolonged time for a gradual elongation. Intervention: Pt supine with the LE relaxed and straightened. Initially this is comfortable to the patient but the stress from gravity creates creep creating strain in the posterior capsule. Simultaneously patella oscillations were performed to ensure that the patient does flex the knee thereby interrupting the creep occurring. This was performed 10-12 min each session. Exercises: 10 sec hold quad set resisted by weighted pulley, supine hip extension with a straightened knee against the resistance of a weighted pulley around the ankle, and standing negative calf raises on a step while maintaining a pulley resisted isometric TKE. **Outcomes** Pt seen 3x/week Visit #4- 110 degrees flexion Visit #8- 0 degrees extension. **Discussion - Conclusions** This case report gives an example of one scenario but an understanding of tissue histology of the remaining posterior capsule, histology of the post-op scar tissue, the possible restriction pathologies of the surrounding musculature and post-op edema must all be taken into consideration after a TKA. All of these post-op deficits will present with different end-feel assessments and follow-up manual treatment and therex should be based on these end-feels.

PO#45

INITIATING REFERRAL FOR INTRA-ARTICULAR INJECTION IN A PATIENT WITH CERVICAL SPINE AND GLENOHUMERAL IMPAIRMENTS

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Background & Purpose The purpose of this case report study is to describe the clinical reasoning for initiating a referral with another provider. A consultation with an orthopedic physician for consideration of a corticosteroid injection was requested for a patient who showed improvement in signs and symptoms related to cervical pain and associated distal symptoms, but not glenohumeral joint (GHJ) pain and impairments. **Description** A 47 year-old diabetic female presented with a five month history of insidious onset left shoulder pain. One month prior to beginning therapy, she fell, producing left-sided cervical, medial scapula and lateral forearm pain. Ten visits over eight weeks, including mobilization to her cervicothoracic spine and GHJ, resulted in decreased pain with improved function in her cervical spine/distal symptoms, but minimal change in GHJ motions and pain. Contact with the primary care physician (PCP) requesting consultation for intra-articular injection was initiated at four weeks, based on clinical presentation of inflammatory stage adhesive capsulitis. The referral was made to the orthopedic physician six weeks into her therapy. **Outcomes** After ten visits over eight weeks: numeric pain rating (NPRS) changed from 9/10 to 1-2/10 at neck; 9/10 to 6/10 at shoulder. Patient Specific Functional Scale (PSFS) worsened: sleeping on left side (5.5 to 2), and reaching overhead (5.5 to 4). After the injection performed at 9 weeks, NPRS at the shoulder was 3/10 and PSFS scores were 7. **Discussion - Conclusions** Careful re-assessment of cervical and GHJ signs and symptoms, knowledge of the natural history of adhesive capsulitis, and familiarity with current evidence for timing and efficacy of corticosteroid injections, provided the rationale for requesting consultation with another provider.

PO#46

A COMPREHENSIVE APPROACH TO THE TREATMENT OF A 13 -YEAR-OLD FEMALE WITH SHOULDER PAIN AND SCAPULAR DYSKINESIS AFTER CLAVICLE FRACTURE: A CASE REPORT.

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Background & Purpose Scapular dyskinesis, a dysfunction of the movement or position of the scapula, is a common consequence of many shoulder injuries. Due to the regional interdependence of the shoulder and various presentations of dyskinesis, sound clinical reasoning is crucial for effective treatment. The purpose of this case report was to incorporate evidence-based practice for the physical therapy management of a patient with new onset clavicular pain after a two-year history of scapular dyskinesis. **Description** A thirteen-year-old female with a history of right clavicle fracture two years prior complained of new onset mid-clavicle and supraspinatus fossa symptoms. She presented with limited shoulder and cervical range of motion (ROM) and tenderness to palpation at the cervico-thoracic junction, first rib and clavicle. Weakness of the rotator cuff and scapular stabilizers contributed to the dysfunction of the scapulothoracic rhythm. Numeric Pain Rating Scale (NPRS) score was 5-6/10 and Shoulder Rating Question (SRQ) was 59.5. The patient was seen on eight occasions over ten weeks with treatment consisting of mobilization of the first rib, clavicle, cervical and thoracic spines as well as soft tissue mobilization, therapeutic exercise and scapular retraining. **Outcome** Cervical ROM was full and painless. Improvement in her rotator cuff and scapular stabilizers was noted with nearly symmetrical shoulder ROM and scapulothoracic rhythm. NPRS was 0/10 and SRQ was 94. **Discussion - Conclusions** Clinical reasoning provided a comprehensive treatment approach for a patient with shoulder pain and scapular dyskinesis. This case highlights the regional interdependence of the shoulder and surrounding structures.

PO#47

PHYSICAL THERAPY MANAGEMENT OF A PATIENT WITH A FIVE-MONTH HISTORY OF MEDICATION-INDUCED MIDTHORACIC PAIN: A CASE REPORT

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Background & Purpose There are many reports in the medical literature of side effects, including significant musculoskeletal pain, related to medications prescribed for patients with osteoporosis, commonly known as ‘bisphosphonates’. Musculoskeletal pain is a well-known potential side effect of prolonged bisphosphonate therapy, but has also has been reported to occur after a single dose of certain bisphosphonate medications. There is a scarcity of literature regarding the effectiveness of physical therapy for patients with bisphosphonate-induced musculoskeletal pain. **Description** This case report describes the use of thrust manipulation in a 57-year-old non-osteoporotic Asian woman with low bone density to address long-term sequelae resulting from ingesting a single monthly dose of bisphosphonate medication (Actonel). After a failed course of physical therapy without thrust manipulation, she was referred to our clinic specifically for a physical therapy regimen that included thrust manipulation. **Outcomes** The patient was discharged pain-free after twelve therapy sessions and returned to full duty as an ER nurse. **Discussion - Conclusions** The growing popularity of bisphosphonates makes it increasingly likely that physical therapists will encounter non-osteoporotic patients who are taking these medications. Evolving autonomy in physical therapist practice makes it increasingly important that the possibility of medication-related musculoskeletal pain be considered. As thrust manipulation is not contraindicated for non-osteoporotic patients with low bone density, offering patients this choice as part of an overall physical therapy regimen may be safe, appropriate, and effective.

PO#48

THE INFLUENCE OF INFECTION ON SIGNS AND SYMPTOMS OF CERVICAL ARTERY DYSFUNCTION: A CASE REPORT

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Background & Purpose Numerous conditions present with signs and symptoms that mimic cervical artery dysfunction (CAD). Careful screening assists in differentiating the cause and appropriate medical management. The purpose of this case is to describe overlapping signs and symptoms of neck pain, CAD, syncope and infection. The use of the IFOMPT cervical examination framework enhanced clinical reasoning resulting in prompt medical referral. **Description** A 20-year-old male Army trainee was referred for cervical manipulation for sub-acute neck pain with radiculopathy. Although the patient attributed symptoms to a recent fall, a well-reasoned screening process identified history of syncopal events and recent infection coinciding with the onset of complaints. Physical examination was conducted in accordance with the recently published IFOMPT Framework for Examination of the Cervical Region including positive vertebral artery insufficiency tests producing dizziness and nausea. **Outcomes** The patient was subsequently referred back to his primary care physician for additional medical management. A CT Angiogram was performed which demonstrated no evidence of CAD, however, there was an incidental finding of diffuse cervical adenopathy consistent with infection. Additional diagnostic testing resulted in a diagnosis of simultaneous active infections of H. Pylori and Urinary Tract Infection. He was subsequently treated with a 14-day course of antibiotic therapy yielding complete resolution of neck pain, syncope and upper quarter symptoms. **Discussion - Conclusions** Physical therapists frequently encounter situations requiring complex differential-diagnosis and advanced screening strategies. In this case, incorporating the IFOMPT Framework for Cervical Examination facilitated prompt referral, medical intervention and resolution of symptoms for an individual presenting with confounding symptoms shared by multiple pathologies.

PO#49

OUTCOMES FOLLOWING DYNAMIC NEUROMOBILIZATION FOR A 35 YEAR-OLD FEMALE PATIENT WITH PIRIFORMIS SYNDROME

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Background & Purpose The annual prevalence of sciatica varies from 9.9 to 25%. Neuromobilization is one suggested treatment for patients with sciatica which has been shown to restore neural mobility, improve blood flow and axonal transport dynamics, and disperse noxious fluids to restore nerve function and reduce symptoms. However, the effectiveness of lower extremity neuromobilization has yet to be determined. The purpose of this case study is to describe outcomes following dynamic neuromobilization and sciatic nerve gliding with conventional physical therapy with an individual with sciatica. Dynamic neuromobilization uses intentional passive gentle oscillatory lower extremity joint movements sequentially applied by the therapist to mobilize the sciatic nerve, especially in areas of restriction. **Description** The patient was a 35 year old female who presented with left gluteal and posterior thigh pain and tingling into her left foot. Following physical therapy examination, she was diagnosed with piriformis syndrome with adverse neural tension, decreased bilateral hip external rotator flexibility, weak abdominals and hip musculature, and bilateral overpronation. The six-week physical therapy intervention involved supine dynamic neuromobilization for 10 minutes each session and slump nerve gliding 3 sets of 10 repetitions per day, as well as therapeutic exercise to address contributing factors. **Outcomes** The patient stated that dynamic neuromobilization in combination with exercise was helpful in reducing her symptoms both immediately and long-term. Pain ratings with provocative activities decreased from 8/10 to 2/10 on the numeric pain rating scale, which exceeds the MDC of 2 points. Modified Oswestry Disability Index score increased from 30/50 to 42/50, which is double the MCID of 6 points. Lower extremity range of motion and strength improved 8 to 29%, and neural tension measured through straight leg raise improved from 58 to 80 degrees. **Discussion - Conclusions** The results of this study are in agreement with current evidence supporting a positive outcome with the use of neuromobilization with conventional physical therapy, as well as evidence that supports that neuromobilization may help restore neural mobility. Reduced mechanosensitivity from utilization of neuromobilization can be measured by amplitude of a positive SLR,

which is between 35 and 70 degrees. This case study addresses the gap in the literature regarding lower extremity neuromobilization, as well as provides a thorough description of technique and dosage.

PO#50

THE EFFECTS OF MANUAL THERAPY ON GAIT PARAMETERS, TRUNK MOBILITY, BALANCE, & MOTOR FUNCTION IN PARKINSON'S DISEASE: A CASE STUDY

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Background & Purpose The primary purpose of this case study was to examine the immediate and short-term effects of manual therapy (MT) on gait parameters, spinal rotation, balance, & motor function in Parkinson's disease (PD). There is little and low level evidence that explore MT in PD. The current evidence show a positive direction for the effectiveness of MT in PD. Manual therapy techniques have shown to improve stride length, gait speed, velocity of limb movement during gait, increase shoulder mobility, decrease pain perception, decrease stress, & reduce muscle rigidity in PD. There is lack of evidence that explore the immediate & short-term effects of MT on balance & trunk mobility in PD. **Description** Subject is a 56 year-old female with PD with Hoehn & Yahr 1.5. Baseline measurements were performed pre-intervention on the 1st visit that included MDS-UPDRS: Part III, cervical & trunk rotation, 10-meter walk test, Mini-BESTest, video gait analysis on treadmill. Intervention consisted of 20 minutes of manual therapy techniques bilaterally to the suboccipitals, scapula, thoracic spine lumbopelvic region, hip, and ankle. Post-measurements were performed immediately after intervention for cervical & trunk rotation, 10-meter walk test, and gait analysis on treadmill. Follow-up 3 days later included testing of all outcome measures. **Outcomes** Within session results show improved bilateral cervical and thoracic rotation improved fast and comfortable speed in the 10-meter walk test, decrease in right shoulder kinematic range of motion during gait. Follow-up visit 3 days post showed maintained cervical and thoracic rotation. Increased gait speed on the 10-meter walk test, increase in right shoulder kinematic range of motion. Increased MiniBESTest test and MDS-UPDRS motor score at post-testing. **Discussion - Conclusions** Manual therapy in PD may show improved cervical & thoracic rotation immediately at treatment, with maintained at follow-up. Manual therapy shows improved time on 10 Meter Walk Test immediately after treatment, & improved short-term effects on 10 Meter Walk Test, increased gait speed, right step length, & right shoulder kinematic range of motion during gait in follow-up session. Short-term improvements were observed in balance on Mini-BESTest & motor score on MDS-UPDRS. Manual Therapy appears to produce immediate & short-term, 3-days, positive effects in gait parameters, trunk mobility, balance, & motor function in PD.

PO#51

UTILIZATION OF MANUAL THERAPY TECHNIQUES IN THE TREATMENT OF LOWER EXTREMITY COMPLEX REGIONAL PAIN SYNDROME: A CASE STUDY

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Background & Purpose Limited research is available regarding the use of manual therapy for the treatment of lower extremity complex regional pain syndrome (CRPS). A study completed by Menck et al found thoracic manipulation to be effective in the management of upper extremity CRPS due to the close proximity of the sympathetic trunk to the thoracic spine. The purpose of this study is to describe the benefits of manual therapy to the lower thoracic spine to affect the sympathetic response associated with lower extremity CRPS. **Description** The subject was a 57-year-old male referred to physical therapy with a diagnosis of CRPS and right foot pain. Upon initial evaluation, the subject was non-weight bearing on the right lower extremity due to pain and presented with a 10-month history of classic CRPS symptoms including trophic changes and edema. The subject demonstrated ankle range of motion limitations, hypomobility of the thoracic and lumbar spine, and impaired neurodynamics. Treatment included spinal and lower extremity manipulations as well as therapeutic exercise to address impaired neurodynamics and joint mobility. **Outcomes** There was a complete resolution of pain and impaired neurodynamics after five treatment sessions. Outcomes included an increase in ankle range of motion, positive trophic changes, and decreased edema. The subject returned to all functional activities and was full weight bearing on the affected extremity. **Discussion - Conclusions** Subjects with lower extremity CRPS can improve with a

treatment approach utilizing manual therapy techniques, including manipulation to the thoracic spine, in conjunction with exercise addressing impaired neurodynamics and joint mobility.

PO#52

MANUAL THERAPY IN A PATIENT FOLLOWING KNEE DISLOCATION WITH PERONEAL NERVE AND VASCULAR INJURY: A REGIONAL, TISSUE-SPECIFIC APPROACH

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Background & Purpose Knee dislocations are a rare injury treated by physical therapists. The incidence of these injuries is low in the general population, but is increasing overall in the athletic population. Knee dislocation injuries can occur as a result of contact or non-contact mechanisms. This case report presents the physical therapy management of one individual with this potentially devastating injury. **Description** A 37 y/o male presented to physical therapy status post knee dislocation and fibular head fracture with vascular and peroneal nerve injury. He was referred to physical therapy for the first time after removal of external fixator hardware used to stabilize the fibular head fracture. The patient was then seen for rehabilitation prior to and after staged surgical intervention for anterior cruciate ligament (ACL), posterior cruciate ligament (PCL), medial collateral ligament (MCL), lateral collateral ligament (LCL), and posterior lateral corner reconstructions with debridement of the peroneal nerve. Post-operative impairments included loss of knee range of motion (ROM), peroneal nerve axonotmesis and persistent neuralgia, hip and knee muscle atrophy and weakness, episodic mechanical back pain, ankle contracture, and marked lateral knee instability after failure of the LCL reconstruction. Treatment focused on manual therapy using combined regional interdependence and tissue-specific approaches with interdisciplinary collaboration at each treatment phase. Specific therapeutic exercise and neuromuscular training were also employed concurrently. Outcomes were tracked at baseline and regular intervals using Focus on Therapeutic Outcome (FOTO) measures. **Outcomes** Goals for knee ROM were met by achieving active knee flexion and extension values within normal limits. Improvements in FOTO scores were well above the threshold for clinical significance and beyond normative values expected. Manipulation under anesthesia was avoided, and the patient achieved adequate motor return to allow for ambulation without an ankle-foot orthosis (AFO) or assistive device other than a knee brace. **Discussion - Conclusions** The patient responded well over time to a combination of manual therapy, specific exercise, and neuromuscular re-education using a collaborative, interdisciplinary, regional interdependence, and tissue-specific approach. Manual Therapy may be beneficial for increasing ROM and decreasing pain in patients after a knee dislocation and nerve injury with subsequent staged surgical reconstruction.

PO#53

IDENTIFICATION OF AN UNDETECTED TIBAL FRACTURE USING ONLY REMOTE TELEMEDINE AND THE OTTAWA KNEE RULES IN AN ELITE HIGH SCHOOL FEMALE SOCCER ATHLETE

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Background & Purpose Literature reports a 99% sensitivity, a 46% specificity and a 99.8% negative predictive value using the Ottawa Knee Rules (OKR) for children over five years of age. Although these rules have been validated in clinical settings, their accuracy using only remote telemedicine (TM) communication has not been reported. **Description** Case involves the diagnosis of a tibial fracture via remote telemedicine communication over Smartphones (SP) in a 15 year-old elite female athlete participating in a national championship soccer tournament. Three players collided, this athlete was carried off the field and was unable to continue play. Evaluation by onsite medical personnel diagnosed the client with a “Charlie-horse” and allowed optional return to play. The athlete contacted a fellowship trained PT known through previous personal contact via SP that evening. She reported intense pain, immediate and ongoing swelling, inability to flex her knee beyond 90 degrees, painful weight bearing (WB) and a sensation of knee instability. Photos and texts exchanged via TM verified all symptoms. OKR indicated the need for radiographs, which were advocated by the PT via SP. The guardians on the trip questioned the recommendation as it was inconvenient. The PT then contacted the athlete’s parent, who was in a third

remote location, via SP, and explained the OKR and need for radiographic imaging. The parent concurred, but the athlete was not taken to the emergency department (ED) by the guardians until the following afternoon. **Outcomes** Radiographs taken in the ED 28 hours after initial insult were read as negative. Crutches were issued and WB was encouraged. No additional care was offered and the athlete returned home 3 days later when the tournament ended. The PT referred the athlete to an orthopedist. A MRI revealed evidence of a dislocated patella, a tibial plateau impaction fracture, bone bruising with contour deformity of the lateral femoral condyle and 1st degree strains to both MCL and ACL. The athlete was placed in a long leg brace locked at 0 degrees extension with WB restricted. **Discussion - Conclusions** The OKR, implemented by the fellowship trained PT remotely utilizing only telemedicine, correctly predicted the lower extremity fracture without onsite physical exam. The failure to expedite a radiograph based on these OKR findings at the time of the injury led to unnecessary WB on the fractured limb and put the client at risk for further injury, which was further complicated by misdiagnosis in the ED.

PO#54

EXERTIONAL SAPHENOUS NERVE ENTRAPMENT IN A COMPETITIVE CYCLIST

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Background & Purpose Anterior knee pain is one of the most common medical diagnoses presenting to Physical Therapists. Determining the precise cause of anterior knee pain can present a challenge to the clinician due to the wide variety of etiologies. The purpose of this case is to present an unusual case of chronic anterior knee pain due to entrapment of the saphenous nerve at its exit from the adductor canal. **Description** The patient was a 21 year-old male competitive road cyclist who presented with a two-year history of anterior knee pain. Onset began after altering his bike fit and was noted as swelling in the anterior knee during a road race. The patient was subsequently unable to train or compete due to swelling, cramping and tingling at the anterior knee with intensity above 100 watts or duration longer than 30 minutes. LEFS was 64/80. The patient had been treated conservatively without change in his symptoms. On reexamination, symptoms were elicited with palpation of the adductor magnus tendon insertion at the adductor tubercle after a 10-minute exertional episode on his bike along with palpation of myofascia thickness. Myofascial restrictions were treated over two sessions. **Outcomes** The patient was able to train 11 hours the following week without restriction of intensity and has returned to competitive cycling without recurrence of symptoms. LEFS was 80/80. **Discussion - Conclusions** The patient presented with entrapment of the saphenous nerve at the exit point of the adductor canal due to myofascial restriction at the adductor magnus tendon. Thickening of the fascia between the vastus medialis and the adductor magnus tendon has been reported in the literature however has not been specifically cited as a mechanism for saphenous nerve entrapment. In this case, symptoms only presented during and immediately after cycling. We hypothesize that this is due to contraction of the vastus medialis and or adductor magnus in the presence of fascial restrictions of the adductor magnus tendon. Since the symptoms could not be reproduced with quadriceps or adductor muscle contractions, perhaps increased fluid volume in the adductor canal via swelling of the femoral artery during exertion played a role in the patient's presentation.

PO#55

BILATERAL SHOULDER FUNCTION RESTORATION OF ELDERLY MALE AFTER FALL UTILIZING SHOULDER/THORACIC MOBILIZATION AND ISOLATED ROTATOR CUFF/SCAPULAR NEUROMOTOR RETRAINING

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Background & Purpose Elderly individuals live within our communities with significant shoulder impairments reducing independence. This case report demonstrates successful impairment-based approach to shoulder function restoration. **Description** 95-year-old male following traumatic fall with persistent bilateral shoulder pain and inability to perform self-care and normal IADL's. Radiographs revealed no fractures. Patient reported history of bilateral shoulder rotator cuff repairs several years ago which did not take well but able to remain living independently. Noted impairments were decreased capsular mobility, marked loss of active ROM, marked rotator cuff deficiencies, scapular dyskinesia, adaptive soft tissue

shortening, hypomobile and kyphotic T-spine, NPRS right shoulder 6/10, left shoulder 5/10, and UEFI baseline score 37/80. GHJ and T-spine joint and soft tissue mobilization followed by isolated rotator cuff and scapular neuromotor retraining program utilized. **Outcomes** Patient able to exceed prior level of function with previous IADL's and self-care tasks restoring confidence to continue living independently. Bilateral shoulder, scapular, and thoracic restrictions were favorably reduced and pain decreased to1/10 bilaterally. UEFI score 63/80 indicating a 26-point change surpassing the MCID for outcome measure. **Discussion - Conclusions** Impairment based rehabilitation post traumatic fall in the very elderly community dwelling patient cohorts can be effective in restoring function, decreasing pain, and restoring confidence for these individuals to remain living independently.

PO#56

PHYSICAL THERAPY MANAGEMENT OF ADHESIVE CAPSULITIS IN A PATIENT WITH UNCONTROLLED HYPOTHYROIDISM: A CASE REPORT

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Background & Purpose The incidence of adhesive capsulitis in patients with hypothyroidism is well documented in the literature; however, physical therapy management of adhesive capsulitis in the presence of thyroid disorders is scarce. The purpose of this case report was to evaluate the implications of uncontrolled hypothyroidism on the physical therapy management of adhesive capsulitis. **Description** Patient is a 49-year old female with adhesive capsulitis of the left shoulder and uncontrolled hypothyroidism. Patient has a five-year history of shoulder pain and has undergone two manipulations under anesthesia with no resolve in range of motion or pain. **Intervention:** Numerous physical therapy interventions provided including: soft tissue mobilization, accessory mobility of glenohumeral joint, neuromuscular re-education, functional mobilizations, thoracic spine mobilizations, and visceral manipulation. All treatments provided were consistent with the Institute of Physical Art's ideology. **Outcomes** After an eight-week treatment period, VAS scores decreased from 7/10 to 6/10 and DASH decreased from 55.1 to 44.2. Minimal change in range of motion; however, ability to participate in recreational activities improved. **Discussion - Conclusions** The clinical relevance of this case is for physical therapists to be aware of the implications in endocrine pathology and how it may affect healing. Physical therapy management can help modulate pain and improve overall function even without improvement in objective measurements.

PO#57

CHRONIC SACROILIAC JOINT AND PELVIC GIRDLE DYSFUNCTION IN A 35-YEAR-OLD NULLIPAROUS WOMAN SUCCESSFULLY MANAGED WITH MULTIMODAL AND MULTIDISCIPLINARY APPROACH

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Background & Purpose Sacroiliac joint pain and dysfunction affect 15-25% of patients reporting low back pain including reports of spontaneous, idiopathic, traumatic and non-traumatic onsets. The poor reliability and validity associated with diagnostic clinical and imaging techniques leads to challenges in diagnosing and managing sacroiliac joint dysfunction. **Description** A 35 year-old nulliparous female with a 14-year history of right sacroiliac joint dysfunction was managed using a multimodal and multidisciplinary approach when symptoms failed to resolve after two months of physical therapy. The plan of care included four prolotherapy injections, sacroiliac joint manipulation into nutation, pelvic girdle belting and specific stabilization exercises. **Outcomes** The patient completed twenty physical therapy sessions over a 12-month period. At six months, the patient's Oswestry Disability Questionnaire score was reduced from 34% to 14%. At one-year follow up, her score was 0%. The patient's rating of pain on a numeric rating scale decreased to an average of 4/10 at 6 months and 0/10 at one-year follow up. **Discussion - Conclusions** A multidisciplinary and multimodal approach for the management of chronic sacroiliac joint dysfunction appeared successful in a single case design at one-year follow up.

PO#58

THE EFFECTIVENESS OF CERVICAL MANIPULATION FOR LATERAL FOREARM RADICULOPATHY

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Background & Purpose Cervical manipulation has been demonstrated to be an effective modality for the reduction of radicular pain as well as change muscle tone in the upper extremity. This case demonstrates the necessity of evaluating and treating the cervical spine with upper extremity conditions. **Description** Pt presented as a 27 y/o healthy male. Pt reported occasional tingling in the right lateral elbow that was insidious in onset and inconsistent with symptom reproduction. Upon evaluation, no pain could be reproduced at the elbow with active, passive, or resistive testing. Further, neurological testing, including upper limb tension testing, was negative. Palpation of the radial head laterally reproduced tingling at the point of palpation. CS screening demonstrated a mild limitation with right rotation and side bending to the right. No pain was elicited with testing and no muscle guarding was palpable. Mobility testing demonstrated a downglide restriction (tested with side bending mobility) at C6-7 on the right side. **Outcomes** A cervical spine manipulation was performed at C6-7. The technique utilized included locking C7T1 to the left with side bending, locking C5-C2 into right side bending/rotation, and providing a thrust into upglide at C6-7 on the left (producing a downglide on the right), all with the patient in supine. An audible pop could be palpated and heard by the treating PT. The patient returned to sitting and reported abolished tingling symptoms at the lateral elbow with palpation. Further, AROM of the cervical spine increased ROM to full (measured by symmetrical chin to shoulder in both rotations). **Discussion - Conclusions** Thrust Manipulation, through mechanoreceptor input in the joint capsules of the spine, can cause an effect at the segmental level of the spine, affecting efferent motor and sympathetic signals as well as afferent sensory input. This case is a clear example of manipulation's effect on sensory awareness as well as improved functional motion in the cervical spine. The broader discussion includes understanding that patient's peripheral symptoms can originate from the spine and tingling may not necessarily be a sign of neural impingement. Tingling, like pain, can be a misperception interpreted by the patient's central nervous system. Such system’s perceptions can be influenced by a spinal facet hypomobility.

PO#59

MANUAL THERAPY, KINESIOLOGY TAPING AND SPECIFIC EXERCISE FOR A LUMBAR LAMINECTEMY PATIENT

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Background & Purpose Post surgical lumbar L4-5 laminectomy/decompression is often managed with a combination of manual therapy and exercise to decrease post-operative pain and improve core and lower extremity muscular performance. **Description** A 77-year-old female, presented with bilateral lower lumbar pain 37 days post L4-5 laminectomy/decompression. Despite reports of pain (3/10 rest; 7/10 activity) subject denied pharmacological intervention secondary to personal convictions. Clinical examination findings revealed significant bilateral lower extremity weakness, a heel width of 4.5 inches during gait, impaired static/dynamic standing balance (Berg Balance Scale: 41/56) and moderate mechanosensitivity to palpation along bilateral lumbar paraspinals. She denied any remaining radicular symptoms at time of examination. Subject exhibited full lower extremity active range of motion. However, lumbosacral active range of motion was most notably limited in the sagittal plane. Grade I and II non-thrust manipulation to the lumbar spine was used in combination with myofascial release techniques. Further, taping techniques to resolve swelling, muscle guarding, and pain. Specific exercise selection was implemented throughout the episode of care to inhibit the pain cycle and improve muscular performance and standing balance deficits. **Outcomes** Twenty-four days post examination, subject reported 0/10 pain at rest and during her previously performed daily activities. Normalization of core and lower extremity strength coincided with normalized gait and 56/56 on the Berg Balance Test. **Discussion - Conclusions** This case report describes the impact of combining spinal non-thrust manipulation, myofascial techniques, and taping methods with scientific exercise selection. This collaboration may provide the accelerated pain

resolution and improved muscular performance required to return to unrestricted daily activities in the geriatric population.

~~**PO#60**~~ **CANCELED**

~~TRANSIENT NEUROGENIC ANTERIOR AND LATERAL COMPARTMENT SYNDROME: CONSERVATIVE MANAGEMENT AND DIAGNOSIS~~

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~~**Background & Purpose** Patients will present with early onsets of multiple diagnoses that often go undiagnosed or treated because they do not fit all diagnostic criteria. Compartment syndrome in the lower extremity is common in athletes that participate in high-level repetitive activities. In the advanced stage, increases in compartmental pressure may cause pain, reduced sensation, and eventually necrosis of tissue. In early stages, the changes may be much more subtle and cause transient symptoms. The perfusion of these vessels may be affected by multiple factors, including neural control, muscle tissue quality, and overall health status. The purpose of this case study is to retroactively assess diagnosis and treatment of a lower leg pain and limited function through clinical reasoning of treatment and patient response. **Description** A 39 year old female type I diabetic with a 3 month history of burning and pain into bilateral lower legs, mild swelling, anteriorly and laterally. Symptoms increased with walking, especially with long distances and increased speeds, increased with ascending stairs>descending stairs. She denies noticing sensation changes, balance issues. She has had no medical treatment to this point for her condition. Findings upon initial two treatments of adverse neural tension, lower lumbar pain with joint hypomobilities bilaterally, firm anterior tibialis and peroneus longus/brevis bilaterally to palpation, proximal tibiofibular joint hypomobilities and pain bilaterally, increase in symptoms with contraction, especially sustained of anterior/lateral compartment musculature, and poor ankle dorsiflexion ROM. **Outcomes** Patient reported symptom relief with most interventions, starting with 50% improvement with proximal tibiofibular joint mobilizations, followed by 20% relief with neural glides, 10% improvement (not sustained) with lumbar treatment, and 20% and full resolution of symptoms (~95% sustained over a 6 month period) after trigger point dry needling. **Discussion – Conclusions** There is currently limited evidence and diagnostic criteria of early compartment syndrome. Neurogenic changes to peripheral blood flow may be affected by central and peripheral neural inhibitory or facilitating factors. Improving dysfunction of joints, neural mobility and nutrition, and release of chronic interstitial fluid may have altered perfusion of vasculature and reduced symptoms, but it is difficult to determine which treatment and therefore, which tissue was ultimately most responsible for resolution of symptoms.~~

PO#61

EFFECTIVENESS OF MANUAL PHYSICAL THERAPY FOR HIP-SPINE SYNDROME

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Background & Purpose Hip range of motion limitations caused by osteoarthritis (OA) may result in compensations such as increased lumbar lordosis and possible lumbar canal stenosis. These symptoms are said to be hip spine syndrome (Offierski & Macnab, 1983). The postural changes can produce soft tissue imbalances between the tonic and phasic muscles, which Janda called the lower crossed or pelvic syndrome(Janda, 1987). Potential treatments for hip OA include total hip replacement (Ben-Galim et al, 2007) but it is invasive, expensive and has risks. Conservatively, manual physical therapy is often sufficient. To report this time, whereas in case of total hip replacement is recommended in the following year osteoarthritis of the hip and spinal canal stenosis, and conduct manual physical therapy five times in one week and improvements. **Description** A 77-year-old male with stage 4 osteoarthritis of the hip and lumbar canal stenosis complained of bilateral lower extremity tingling and 5/10 pain after walking 300 meters and/or after 5 minutes of standing. He presented with a 1.5cm leg length discrepancy R<L, ROM of 85° hip flex, －5° ext, 20° add, 30° abd, 20° IR, 25 ° ER, 40°trunk flex and 15 ° of RR all limited by pain. His Harris Hip Score was 45 pts and Modified Oswestry Disability Index 50%. The inferior glide accessory mobility of the right hip was found to be hypomobile as were the P/A motions of L1/L2, L2/L3, L3/L4, and L5/S1. Treatment included soft tissue manipulation to the surrounding hip musculature, inferior glide to the hip joint, manipulation to the thoracolumbar fascia, rotary manipulation to the thoracic

and lumbar spine and low back stabilization training. **Outcomes** After 5 treatment the patient was able to ambulate up to 500 meters with 2/10 pain. ROM improved to 100° hip flex, 5° hip ext, 30° add, 35° abd, 25° IR and 45° ER . Trunk flexion also improved to RR 50°, 25 ° RL. Oswestry improved to 36% and HHS to 65 points. **Discussion - Conclusions** Despite the severity of hip OA, this patient was able to avoid an invasive and expensive total hip replacement in very few treatments as well as avoid weeks of rehabilitation. The Japanese insurance health care system is confined to up to 260 minutes/month of physical therapy. If patients are seen more than 150 days from the onset, often reimbursement is terminated. Such cases show how manual physical therapy can benefit the patient and the healthcare system.

PO#62

APPLICATION OF CLINICAL PRACTICE GUIDELINES FOR EXAMINATION AND TREATMENT OF ACHILLES TENDINOPAHTY

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Background & Purpose Overuse disorders of the Achilles tendon are frequently reported injuries in literature. A Clinical Practice Guideline (CPG) was outlined in 2010 by the Orthopaedic Physical Therapy Section for diagnosis, examination, and intervention of Achilles tendinopathy. Literature is lacking regarding outcomes when following the CPG. The purpose of this case report is to demonstrate the outcomes of applying the CPG for Achilles tendinopathy in a single patient. **Description** The patient was a 33 year old-male with a history of chronic bilateral Achilles tendinopathy, with associated ankle and foot pain. He presented to the clinic after an exacerbation of symptoms 2 weeks prior. He reported a deep aching pain and stiffness in bilateral Achilles tendons, 3-5 cm from the insertion, and a stabbing pain in the arch of bilateral feet. He reported symptoms during standing for 10 minutes, with stair or hill climbing, and ambulating more than a quarter mile. His objective measurements demonstrated bilateral decreased dorsiflexion range of motion, lacking 3° from neutral on the left and lacking 5° on the right. He demonstrated decreased plantar flexion strength at 2+/5 bilaterally. Hypomobility was noted throughout joint glides, as well as a severe pes cavus deformity. Interventions from the CPG were implemented including eccentric loading and stretching exercises, iontophoresis, and manual soft tissue mobilization. The patient completed 4 treatment sessions over 11 days. **Outcomes** On a follow-up visit 4 weeks after the initial evaluation, the patient reported no difficulty, limitation, or pain with ambulation or stair climbing. A clinically significant change was seen in pain, decreasing from 6.6 to 0.4 cm on the VAS. The patient's functional ability score increased from 40% to 88%, also demonstrating a clinically significant change in the Care Connections™ Lower Extremity Outcome Scale. He demonstrated an 8° increase in active dorsiflexion on the left and 7° increase on the right. Plantar flexion strength improved to 4/5 on the left and 3/5 on the right. **Discussion - Conclusions** This patient fit the diagnostic criteria outlined in the CPG for Achilles tendinopathy. Decision making for interventions was guided by applying the CPG and current, best evidence, resulting in significant improvements in pain and function. This documents the practical benefits of the use of the CPG for Achilles tendinopathy.

PO#63

THERAPEUTIC NEUROSCIENCE EDUCATION AND GRADED MOTOR IMAGERY WITH MANUAL THERAPY AND EXERCISE IN TREATMENT OF A PATIENT WITH COMPLEX REGIONAL PAIN SYNROME IN THE RIGHT UPPER EXTREMITY

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Background & Purpose Chronic Regional Pain Syndrome (CRPS) is a chronic pain condition that can affect an extremity after traumatic injury. Prognosis can vary and anecdotal evidence suggests early treatment to be the most beneficial, however, evidence is limited as to which treatments produce the most successful outcomes. The purpose of this report is to describe the use of Therapeutic Neuroscience Education (TNE) and graded motor imagery with manual therapy and exercise for treating a patient with CRPS. Current evidence has shown that neuroscience educational strategies (TNE) are able to reduce pain,

increase function, reduce fear, improve movement, and also change cognitions and brain activation during pain experiences. **Description** A 27 year old patient developed CRPS after a hand crush injury on 7/13/2011 with failed conservative therapy including OT, aquatic, psychiatric, PT, and pain management injections. The patient complained of a burning sensation from his right hand and traveling up his arm to his neck. He also complained of swelling and extreme sensitivity to touch in the hand. A spinal stimulator was placed in his mid-thorax on 3/14/2014 with leads into his right upper extremity. His doctor referred him two weeks later for "physical therapy to right upper extremity". He was treated with TNE, which was followed with aerobic exercise, strength training, graded motor imagery, and manual therapy. **Outcomes** Patient's comparable signs were limitations with active shoulder flexion, scaption, abduction, and reaching behind his back. Laterality testing (speed & accuracy) was performed via computer program called "Recognise." After one month, improvements include increased overhead motion of nearly 30 degrees in all planes. Reaching behind his back has improved from L4 to T10. Ability to recognize right vs. left hands has increased in both speed and accuracy. (10 seconds to 3.1 seconds, 44% to 76%). Visual Analog Scale pain rating decreased from 3.5mm to 2.5mm. This patient will continue therapy with plans to add mirror box therapy to his current treatment plan. **Discussion - Conclusions** Symptoms secondary to CRPS can be highly diverse from patient to patient. Treatment should not only focus on impairments but also underlying central nervous system dysfunction. This case describes significant gains in shoulder motion and reductions in pain when including the use of neuroscience educational strategies (TNE) and graded motor imagery.

~~PO#64~~ CANCELED

~~THE IMMEDIATE EFFECT OF LONG AXIS MOBILIZATION OF THE HIP JOINT ON JOINT SPACE WIDTH~~

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~~**Background & Purpose** Previous studies have indicated the benefits of long axis mobilization of the hip joint. Long axis mobilization is considered to separate opposing joint surfaces and widen the joint space. However, no studies have evaluated the mechanical effect of long axis mobilization of the hip joint on joint space width (JSW). The purpose of this study was to investigate the immediate effect of long axis mobilization of the hip joint on JSW. **Methods** We included 15 asymptomatic, healthy volunteers, age, 25-34. Three radiographs were obtained with the subjects in the supine position, before and after loading with 10% of body weight, and after long axis mobilization. JSW was measured by one radiologist at the point described by Jacobson and Sonne-Holm. Long axis mobilization was performed only on right hip joint. **Results** There were significant changes in JSW on right hip joint and left hip joint between the base line (before loading) and after loading. We also observed a significantly increased JSW only on right hip joint between periods that followed loading and long axis mobilization on right hip joint. There was no significant change in JSW on left hip joint between periods that followed loading and long axis mobilization on right hip joint. **Discussion - Conclusions** Our results suggest that long axis mobilization of the hip joint increased JSW.~~

PO#65

A MULTIMODAL APPROACH IN THE TREATMENT OF AN INVERSION ANKLE SPRAIN

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Background & Purpose Inversion ankle sprains are a common injury and deficits with weight-bearing tolerance and dynamic stability can lead to a delay in return to recreation activities. The purpose was to describe a multimodal approach using orthopedic manual therapy (OMT) and kinesiology taping (KT) combined with closed kinetic chain (CKC) exercise for treatment of an inversion ankle sprain. **Description** A 23 year-old patient presented to the clinic 11 days after sustaining an inversion ankle sprain from a fall while rock climbing. The patient demonstrated decreased dorsiflexion (DF) range of motion (ROM), difficulty completing an 8-inch step-up, and was unable to perform a unilateral heel raise (HR). Lower extremity functional scale (LEFS) and Foot and Ankle Ability Measure (FAAM) scores were recorded at initial evaluation (IE) and discharge. OMT included posterior talar glide mobilization with movement and

distal tibiofibular anterior-posterior mobilizations. KT included techniques to promote DF. Exercise activities incorporated only CKC positions. Stretching activities were not included during physical therapy sessions; however the patient was educated on stretching and ROM activities for the home exercise program. **Outcomes** The patient was seen for 6 visits and achieved goals set at IE for DF ROM, unilateral HR, and 8-inch step test. LEFS improved from 43.75% to 87.5% and FAAM improved from 51.19% to 91.67% for ADL and 9.38% to 81.25% for sports subscales. **Discussion - Conclusions** A multimodal approach incorporating OMT, KT, and CKC exercises may be beneficial to improve functional deficits and dynamic stability to facilitate return to activity in patients with inversion ankle sprains.

PO#66

THORACIC THRUST MANIPULATIONS PERFORMED BY A STUDENT PHYSICAL THERAPIST WITH A 57 YO MALE POST ROTATOR CUFF REPAIR: A CASE REPORT

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Background & Purpose Rotator cuff macrotrauma is a very common injury. Published studies indicate thrust manipulations performed by licensed physical therapists help patients with shoulder impingement. The purpose of this case report was to describe the outcomes of including thoracic thrust manipulations performed by a student physical therapist one time to increase active and passive shoulder range of motion in a comprehensive plan of care for a patient s/p rotator cuff repair. **Description** The patient was a 57-year-old male post traumatic massive rotator cuff tear with only the infraspinatus tendon repairable. PMH was unremarkable and post-operative care consisted of immobilizer for 1 week followed by referral to PT five weeks later. The patient's chief complaints included pain, sleep disturbances, weakness, decreased ROM, fear of re-injury, and inability to perform ADLs/IADLs with his right upper extremity. Comprehensive treatment consisted of strengthening, stretching, GH joint mobilizations, patient education and prone extension/closing thoracic high velocity low amplitude (HVLA) thrust manipulations. **Outcomes** Over the course of treatment, the patient demonstrated significant improvements in strength, ROM, joint mobility, and pain. The patient stated the HVLA thrust manipulations were extremely beneficial for increased shoulder ROM and attributed all changes in motion during his first follow up visit to this intervention. Both flexion and scaption values increased immediately following the thrust manipulation without the use of other interventions. The largest increase was found in active flexion at 22 degrees, a 57.9% increase. Active scaption increased 4 degrees, an 11.1% increase in ROM. **Discussion - Conclusions** Outcomes following the combination of thrust manipulation with standard care included significant improvements in ROM, strength, pain, and function. It is unlikely that this patient's rapid ROM change occurred from tissue healing or increased muscle strength alone due to insufficient time. Also, changes cannot solely be based on user error, as A/PROM flexion values were greater than the cited SEM of 4-7°. Thrust manipulation is categorized as en entry-level skill, however is not commonly performed by SPTs on clinical internships. SPTs are adequately trained to perform manipulations and additional training in more advanced techniques to be better prepared to deliver optimal care to our patients is recommended.

PO#67

DRY NEEDLING TO TREAT SYMPTOMS OF DYSTONIA IN A PATIENT WITH PERIPHERAL MYOCLONUS: A CASE REPORT

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Background & Purpose Dry needling is used by physical therapists to treat neuromuscular pain and movement impairments but documentation is lacking about outcomes of its use. The purpose of this case is to discuss a patient diagnosed with peripheral myoclonus and the use of dry needling to address her constant elbow muscle dystonia. **Description** The patient is a 14 year-old female who was hit in the right shoulder in a basketball game in February 2014. The patient felt immediate numbness in a glove-like distribution from elbow to wrist as well as swelling in this area. Within five minutes the numbness subsided but her right brachioradialis began to contract involuntarily. Throughout the following weeks, her right elbow was in a state of constant dystonia. Right arm movement intensified her symptoms causing involuntary shoulder flexion to 90 degrees and repeated elbow contraction from 40 degrees of flexion to

110 degrees. These symptoms would decrease to a baseline level of muscle fasciculations without shoulder or elbow movement after trigger point massage to her scapular area. The patient was seen in the emergency room, by her primary care physician, a family chiropractor, neurologists and was eventually diagnosed with peripheral myoclonus. She was not prescribed any medication for the condition but was referred to physical therapy by a neurologist. She was treated with dry needling with and without electrical stimulation, as well as massage to her scapular area, thoracic manipulation, and neurodynamic movements. This was to be performed twice weekly for 6 weeks or until symptoms resolve. **Outcomes** The patient went over 60 days without any relief from the constant muscle dystonia. Immediately following the first session of dry needling, she had complete relief of the dystonia for 15 minutes. When the symptoms returned, her arm was contracting but has remained at a level below her original baseline symptoms since that initial treatment. The outcome measures include observational findings regarding her dystonia as well as pain or tenderness with palpation throughout each dry needling session. **Discussion - Conclusions** Although documentation supporting dry needling is limited, many resources do support the use of dry needling by physical therapists to treat neuromuscular pain and movement impairments, such as this case. This case reports the use of dry needling by a physical therapist as an intervention that benefited this patient after 60 days of no relief.

PO#68

CLINICAL OUTCOMES FOLLOWING MANUAL PHYSICAL THERAPY AND EXERCISE FOR KNEE OSTEOARTHRITIS: A CASE SERIES

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Background & Purpose The purpose of this case series was to describe the clinical outcomes of three patients with knee osteoarthritis following a treatment program of manual physical therapy as described by Deyle with the addition of hip strengthening. **Description** Three patients with varying levels of disease were seen for 8 visits with a combination of manual therapy and exercise as described by Deyle with the addition of hip strengthening. The Numeric Pain Rating Scale, Western Ontario and McMaster Universities Osteoarthritis Index, Lower Extremity Functional Scale, and 6-min walk test were recorded at baseline, after 4 visits, and again at discharge at 8 visits. The Global Rating of Change Scale was collected after 4 visits and again at discharge at 8 visits. **Outcomes** Patient 1 and 2 had positive outcomes on all measures and a minimally clinically important difference (MCID) change on the global rating of change (GROC) scale. Patient 3 had a negative MCID change on the GROC, but had an increase in his 6-min walk test. **Discussion - Conclusions** Improved outcomes appeared to be inversely associated to the state of disease progression and the risk factors associated with knee OA. It was demonstrated that manual physical therapy in combination with exercise has benefits to patients at all stages of disease progression.

PO#69

A MULTIMODAL REGIONAL INTERDEPENDENCE APPROACH IN THE TREATMENT OF CHONRIC LATERAL EPICONDYLAGIA

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Background & Purpose Despite the prevalence of lateral epicondylagia, controversy exists surrounding the most effective treatment options to resolve this condition. The purpose of this case report is to describe a multimodal regional interdependence approach used to conservatively manage a patient with elbow pain and functional deficits due to chronic lateral epicondylagia. **Description** A 50 year-old right-handed male presented to physical therapy (PT) nine months after eccentrically loading the right elbow while dropping a heavy boat battery. Patient returned for further PT management due to continued right elbow pain and failed response to a cortisone injection and previous PT management. Key primary impairments included decreased joint mobility and ROM throughout the upper quadrant including the cervicothoracic spine, decreased bilateral periscapular strength/motor control, right grip strength, and reduced deep neck flexor endurance. Functional limitations included inability to shake hands, perform gripping tasks, hold items, and recreational weight lifting. Multimodal interventions included joint mobilizations/manipulations to the cervicothoracic spine, elbow, and wrist, soft tissue mobilization, Mulligan Mobilization with Movement, trigger point dry needling, and therapeutic exercises (eccentric focus). **Outcomes** Patient was seen for 15

visits over three months and demonstrated more than a 50% improvement in pain and Quick DASH score, and delayed onset of pain with grip strength testing. Key inter-session improvement was noted following the introduction of manual techniques to the cervicothoracic spine. **Discussion - Conclusions** A multimodal regional interdependence approach may be beneficial to promote pain reduction and functional improvements in patients with chronic lateral epicondylagia. Future research should investigate the effectiveness of these interventions on a larger sample.

PO#70

MULTIMODAL APPROACH FOR A PATIENT COMPLAINING OF CHRONIC CERVICAL PAIN, CERVICOGENIC HEADACHES, TINNITUS AND TEMPORAL MANDIBULAR DISORDER, ONE YEAR AFTER CRANIOTOMY FOR BRAIN TUMOR RESECTION: A CASE REPORT

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Background & Purpose The purpose of this case report is to describe the management of a patient who is one year post-operative for a right sided craniotomy to remove a pituitary tumor. She developed multiple orthopedic dysfunctions after her craniotomy. The management of craniotomy patients can be challenging given the anatomical structures involved. The effect these surgeries can have on the cranio-mandibular system can be difficult to predict. Often these patients are unsure as to who can provide optimal care, due to the difficulty in identifying the source of their symptoms. The paucity in the literature regarding craniotomy after care and, or its effects can make optimal management even more difficult. **Description** 34 year-old female inmate serving her sentence at a correctional facility was referred to physical therapy for initial chief complaint of temporo-mandibular disorder (TMD). Patient had a history of pituitary macroadenoma, four resection surgeries were successful in removing the benign tumor; this however resulted in CN III palsy, strabismus and development of diabetes insipidus. Chief complaints started 4 months after surgery, which included cervicogenic headaches (CGH), limited painful mandible ROM with painful mastication, cervical ROM limitations with right-sided pain and tinnitus. These problems were affecting her quality of life, for which she sought help from her primary care provider, neurosurgeon specialists and a dentist who ultimately made the referral. **Outcomes** Patient was seen for 13 visits over a 2-month period. Headaches were reduced from 1-2 daily to 1-2 per month lasting about an hour. Mandibular depression increased from 32mm to 40 mm, plus she was able to resume her previous diet with painless mastication. There was a decrease in Neck Disability Index (NDI) from 28% to 4% at discharge. She also denied tinnitus at the conclusion of her physical therapy sessions. These changes were maintained at 7 and 13 months follow up. **Discussion - Conclusions** Post-craniotomy rehabilitation may pose many challenges. It is imperative for the clinician to consider interrelated structures and their role in the contribution of the entire symptomatology. While this case report cannot infer cause and effect, it can help the clinician consider a multi-modal approach for the treatment of cranio-mandibular associated disorders including CGH, cervicalgia and tinnitus especially for those recovering from craniotomies. Randomized clinical trials are needed in order to determine the success of such approach

PO#71

TREATMENT OF MID-THORACIC PAIN IN A PATIENT WITH A HISTORY OF ENDOCARDITIS: A MULTI-MODAL APPROACH

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Background & Purpose There is evidence suggesting patients may experience chronic pain after surgery due to sequellae of the surgery itself. For patients undergoing thoracic procedures, this may present as thoracic or costovertebral pain. The purpose of this study was to provide a multi-modal treatment for a patient with thoracic dysfunction and right shoulder pain following thoracotomy. **Description** The patient was three years status-post thoracotomy for endocarditis with a sequellae of upper thoracic dysfunction. A 23-year-old patient presented to the clinic with chronic pain along the medial border of right scapula radiating to the right shoulder. Symptoms affected her activities of daily living including all overhead motions, current job and ability to sleep at night. The treatment consisted of scapular stabilization, periscapular strengthening, and thoracic ROM exercises along with manual therapy. Manual therapy

techniques included central, unilateral PA glides, transverse glides to the C6-T-6 as well as thrust manipulation to the cervico-thoracic junction and upper thoracic spine. **Outcomes** The patient regained thoracic and shoulder normal ROM without pain. She was able to perform 10 repetitions of overhead military press with 5 lb. dumbbells without symptoms compared to 4 repetitions with severe symptoms at initial evaluation. Her Quick DASH score decreased from 18.18% to 2.2% at discontinuation. The patient was able to resume all previously painful recreational activities. **Discussion - Conclusions** An impairment-based multi-modal approach focusing on scapular stabilization, strengthening and manual interventions may be helpful in treating patients with chronic upper thoracic pain with a history of thoracotomy. Further study of these treatment effects is recommended.

PO#72

PHYSICAL THERAPY MANAGEMENT FOR PLANTAR FASCIITIS USING INSTRUMENT-ASSISTED SOFT TISSUE MOBILIZATION, JOINT MOBILIZATION AND EXERCISE: A CASE REPORT

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Background & Purpose Plantar fasciitis (PF) is a common overuse injury experienced by 10-16% of the general population that can lead to a significant loss of function.[1] No non-operative management approaches for PF have been shown to be clearly superior when compared to others for the treatment of this condition.[2] Instrument-assisted soft tissue mobilization (IASTM) is a non-invasive, manual therapy technique utilized for the treatment of soft tissue dysfunction. Current research suggests that incorporating IASTM into treatment protocols may improve healing time,[2] however treatment effects associated with IASTM for PF are non-existent. The purpose of this case report is to describe the physical therapy management and outcomes in a patient with bilateral PF who was treated with IASTM, joint mobilizations and exercise. **Description** The patient was a 53 year-old female with a primary physical therapy diagnosis of bilateral PF. The patient reported symptoms began 1-year prior when she was training for a half-marathon. The patient had previously failed conservative treatment over the past year, which consisted of two bouts of physical therapy and orthotics. The patient's primary complaints were pain with first morning steps, biking, running, and walking. The patient was treated approximately 2 times per week for 17 visits over a 12 week period with a plan of care including IASTM, joint mobilizations, and exercise. **Outcomes** Following 17 treatment sessions over a 12-week period the patient made clinically meaningful improvements in all outcome measures (NPRS, LEFS, PSFS) and returned to her preferred recreational activities. **Discussion - Conclusions** PF is a painful condition that often takes up to a year to resolve. The patient described in this case had symptoms for over a year and previously did not respond to those conservative interventions typically described for PF. However she had clinically meaningful improvements during this episode of care. This case suggests that the addition of IASTM to joint mobilization and exercise may be an effective treatment for PF.

PO#73

REGIONAL DYSFUNCTIONS OF THE UPPER QUARTER PAIN SYNDROMES - A CASE SERIES

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Background & Purpose Current research suggests evidence for certain somatic presentations in the Upper Quarter (cervical, thoracic, and upper extremity) Pain Syndromes (UQPS). In clinical practice, it was noted that the identification and treatment of these somatic presentations/Regional Dysfunctions help alleviate the UQPS effectively, both acute and chronic. Four case scenarios with these Regional Dysfunctions and their treatment outcomes demonstrate the need for further focus with these Regional Dysfunctions while managing the UQPS. The purpose of this case series is to emphasize the need to evaluate and treat the Regional Dysfunctions contributing to the UQPS. **Description** Four cases with ages 33 to 65, male or female, were treated for upper thoracic pain, neck pain, and/or shoulder pain. The symptoms were either acute or chronic and with or without injuries. They had one or more of the below associated Regional Dysfunctions, with or without direct dysfunctions of the symptom areas matching their diagnosis, i.e.: Neck Pain, Shoulder Pain/Strain, and Back pain. They all had thoracic and/or rib dysfunctions in particular. **Regional Dysfunctions contributing to the UQPS** Thoracic Closing

Dysfunctions and/or First Rib Dysfunction Pectoralis Minor Tightness Serratus Anterior and Lower Trapezius Weakness Sub-occipital Tightness/Dysfunctions Cervical Core Weakness. **Outcomes** All four cases had good outcomes with the following techniques as evidenced by NPRS, NDI, DASH, Subjective Quality of Life Rating (as compared to premorbid level as 100%), and symptomatology (ROM, strength, tenderness, headache, sleep quality, positional dysfunction, muscle tone, and etc). **Techniques addressing the Regional Dysfunctions** Thoracic Closing Manipulations First Rib Manipulation Pectoralis Minor and Teres Major Stretches OA Mobilization Cervical Core Strengthening Serratus Anterior and Lower Trapezius Strengthening. **Discussion - Conclusions** These case scenarios with the UQPS had good outcomes only after addressing the above said Regional Dysfunctions. It is to be noted that both acute and chronic conditions had improved well, through different age groups and etiologies. A collective understanding of these regional dysfunctions will give the clinicians the edge to quickly resolve patient symptoms, and to help decrease reoccurrences. It is recommended that the clinicians should consider routinely assessing these regional dysfunctions for the UQPS. Further research is warranted for a possible clinical prediction rule to promote treatment outcomes for the UQPS.

PO#74

MANAGEMENT OF A 46 YEAR-OLD HIGH-LEVEL ATHLETE WITH PRE-POST PHYSICAL THERAPY FOR HIP RESURFACING SURGERY: A CASE REPORT

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Background & Purpose Hip joint resurfacing surgery is becoming a preferred choice for hip restoration in the younger active patient population. Compared to the total hip arthroplasty (THA), hip joint resurfacing preserves the femoral head and neck and maintains the natural size of the hip joint. The purpose of this case report was to report the pre-surgical physical therapy management, report on the resurfacing surgery success, and report on the post-surgical physical therapy success. **Description** The patient was a 46 year-old male athlete with a ten-year history of left hip degenerative joint disease (DJD). In 2003 the patient was diagnosed with a left hip labral tear from a barefoot waterskiing injury. Despite ten years of physical therapy management, the left hip had progressed to the point of severe debilitation. The patient underwent left hip resurfacing (Birmingham) surgery on July 12, 2013. The surgery was 100% successful. Post physical therapy management included minimal manual physical therapy, progressive exercises, and a multiple sport reintegration program. **Outcomes** At six months post surgical left hip resurfacing the patient reported to be pain-free in all activities of daily living and started returning to low level running and maximum level swimming. At twelve months the patient reported a return to all previous sports (running, swimming, golf, ultimate frisbee, basketball and waterskiing) with pain free ability. **Discussion - Conclusions** This patient's hip DJD was managed by a physical therapist (himself) for ten years before needing left hip joint resurfacing surgery. The Birmingham hip joint resurfacing surgery with post-surgical physical therapy was greatly successful for returning this patient to pain-free function and pain-free high-level sports activities. Manual physical therapy was moderately successful before surgery and not needed after surgery for this patient. The decision for surgery was based on left hip imaging status, pain and dysfunction. It is strongly recommended that hip surgery be considered in direct correlation to the amount of hip DJD for patients who qualify for the hip joint resurfacing (Birmingham) surgery.

PO#75

LINKING WHIPLASH ASSOCIATED DISORDER (WAD) AND CONCUSSION IN SPORT: A THEORY REPORT

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THEORY/BODY: Sports-related concussion incidence ranges from 300,000 to 3.8 million. This type of mild traumatic brain injury (MTBI) is serious for younger athletes. High school male football and female soccer athletes have the highest incidences. Post-concussive biochemical changes disrupt the brain's metabolic processing triggering an energy crisis compromising synaptic function causing impaired cognition. Abnormal eye movement is an initial marker for decreased brain function. Acceleration and

deceleration in concussion and whiplash injuries cause soft tissue damage, neck pain, cognitive, vestibular, and oculomotor symptoms. Musculoskeletal injuries and concussion exhibit cognitive deficits, suggesting symptoms arise from more complex mechanisms than direct brain trauma and altered metabolism. Disrupted afferent and efferent neuro-feedback loops alter cervical proprioception creating a barrage of somatosensory input, manifesting the shared symptoms. Persistent wind-up of somatosensory noxious input produces altered motor control patterning leading to cortical reorganization, or "smudging," which can develop into sensitization centrally. Pain causes and strengthens movement compensations through reflex patterns, primarily gamma loop and central inhibitory mechanisms. Processing distortions have cumulative deleterious effects on the postural control system diminishing the brain's ability to rapidly and automatically integrate postural information while maintaining higher cognitive function and musculoskeletal reaction time. Pre-existing summative nervous system overload, such as altered movement patterns, disruption of cervical proprioception, or musculoskeletal pain, may increase the risk for concussion-like symptoms, revealed through deficits in postural stability, ocular tracking, cognitive reasoning, and motor patterning. These are measured by balance or movement assessments, eye reflexes, smooth pursuit testing, neurocognitive tests, and functional movements screens.

PO#76

FASCIAL MANIPULATION CONNECTIVE TISSUE ROLE IN PAIN NEUROMATRIX, REGIONAL INTERDEPENDENCE, AND MOTOR CONTROL

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THEORY/BODY: Innervated deep fascia influences proprioception and motor control through muscular myotendinous insertions. Studies implicate fascia in myofascial pain, but not its tensile network. Stecco developed the Fascial Manipulation® Method (FM®), a biomechanical model based on regional interdependence and tri-planar assessment of deep fascia. A synthesis of pain patterns, movement impairments, palpatory tests, and altered deep fascia assess the myofascial system. Regional interdependence incorporates kinetic chain biomechanics, neurophysiological mechanisms, and biopsychosocial considerations. Pain alters cortical neurological motor programing, reorganizes motor and sensory cortical function and may initiate comprehensive neuroplastic changes, causing central sensitization. Multisystem afferent neural activation reinforces movement compensations, causing the tissue breakdown and further sensitization comprising the pain neuromatrix theory. Low pH (<6.6) increases hyaluronic acid (HA) viscosity causing muscle stiffness resulting in areas of "densification." FM® intervention's tangential oscillations may restore HA homeostasis by causing an outward flow of HA, increasing lubrication, causing a thicker fluid gap between fascial layers, increasing sliding (fascial gliding), and permitting optimal muscle function. This normalizes movement patterns and muscle function affecting biotensegrity via the neural mechanisms of central sensitization, neuroplasticity, and somatosensory reorganization. FM® research on patellar tendinopathy, whiplash, chronic ankle sprains, and chronic shoulder pain demonstrated decreased pain, and increased ROM and strength. Research correlates changes in motor unit recruitment with myofascial pain syndrome. Motor control, governed by cortical centers, may influence connective tissue and nervous system plasticity though movement pattern alterations. FM® theory explains fascia's role in motor unit recruitment, proprioception, and multisystem interrelationships.

~~**PO#77**~~ **CANCELED**

~~ALGORITHM-BASED CLINICAL REASONING: A NEW TOOL IDENTIFYING THE NEED FOR DIAGNOSTIC IMAGING IN A MULTIFACTORIAL PATIENT~~

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~~**Purpose** As direct access increases throughout the country, the physical therapy profession is going to be challenged with patient presentations and differential diagnoses that may warrant imaging techniques to determine the course and effectiveness of conservative interventions. The purpose of this report is to use a patient case to present a new algorithm-based decision-making tool that will assist a clinician in recommending the appropriate diagnostic test. **Description** Currently, no specific algorithm exists that~~

~~outlines the clinical reasoning for a physical therapist to discuss with a physician the introduction of imaging techniques for soft tissue injuries of the knee; a comprehensive clinical picture is required. The first section of the algorithm incorporates the subjective information, which includes the location of symptoms, mechanism of injury, and red flags. The second section uses the data from the objective examination including the parametric values and efficacy of special tests. The final section will determine whether the introduction of a diagnostic imaging or the continuation of treatment is the supported choice. The subject examined was a 39 year old female who, six weeks after a fall from a chair, had an exacerbation of chronic low back pain and the acute onset of left anterior hip and lateral left knee pain.~~ ~~**Summary of Use** The algorithm presented provides an evidence based template for a clinician to reference in order to continue with physical therapy treatment or recommend diagnostic examination; specifically the introduction of magnetic resonance imaging when presented with multi factorial patients who have lumbar, hip, and knee pain.~~

PO#78

FACTORS IDENTIFIED IN THE PHYSICAL EXAMINATION THAT ARE ASSOCIATED WITH LUMBAR STRESS INJURY IN INDIVIDUALS WITH LOW BACK PAIN

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Background & Purpose Atraumatic pars fractures occurring in young, athletic populations and have been reported in many sports. Such fractures are difficult to diagnose. There are no known conservative clinical predictors to aid diagnosis. The purpose of this study is to identify variables that may be associated with pars interarticularis fractures. **Description** Patients (n=2, 100% female) were referred to physical therapy with medical diagnoses of low back pain. Patient one (age 14) 3 weeks status post injury associated with cheerleading presented with low back pain. Baseline disability was 26% on the Oswestry Disability Index (ODI) and 2/10 Numeric Pain Rating Scale (NPRS). Patient two (age 17) previously active in cross country, presented with low back pain three months after a traumatic fall while tubing on the water. 36% (ODI) and 7/10 (NPRS). Patients underwent a physical examination in effort to find variables associated with spondylolysis. **Outcomes** Patient one MRI was positive for a L5 pars fracture. Patient two denied MRI imaging and continued with conservative treatment. **Discussion - Conclusions** In this case series, patients presented with low back pain with different mechanisms of injury. Findings from specific tests and measures can be loosely postulated to indicate pars fractures. These variables may include increased training volume, young, athletic, lumbar hyperlordosis, pain with lumbar rotation, pain with lumbar extension, rising from a seated position, one legged hop test, a positive repeated movement screen, and rising from a supine position to a standing position. Further research is warranted to increase the validity of the variables.

PO#79

A PRELIMINARY INVESTIGATION FOR IDENTIFICATION OF PREDICTORS TOWARDS DEVELOPMENT OF A CLINCAL PREDICTION RULE FOR THE DIAGNOSIS OF PATELLOFEMORAL PAIN SYNDROME - A CASE SERIES.

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Background & Purpose Patellofemoral pain syndrome (PFPS) is the most frequently diagnosed condition in adolescents and adults complaining of pain in anterior knee and around patella. The etiology of PFPS is suggested to be multifactorial. Currently there is no clear consensus on the use of various clinical or functional tests in the diagnosis of PFPS. The purpose of this case series is to identify a cluster of clinical findings towards developing a diagnostic clinical prediction rule to aid in diagnosis of PFPS. **Description** Four patients with the age range of 20 to 50, male and female were referred to outpatient physical therapy with anterior knee pain. Their symptoms were present for 3 months or more. Complete lower quarter evaluation was performed and various dysfunctions were identified. **Outcomes** Based on review of clinical literature and observation during clinical practice the following factors were identified as predictors towards development of clinical prediction rules.1. Pain with resisted Isometric contraction of Quadriceps Femoris. 2. Positive eccentric step down test, 3.Tenderness in medial/lateral

retinaculum, 4.Pain with squatting, 5.Weakness of hip abductor/extensor strength. All patients in the case series presented with a minimum of 4 out of the 5 predictors. **Discussion - Conclusions** Among the many, some of the proposed factors contributing to PFPS include mal-alignment due to structural abnormalities, Muscular dysfunction and imbalance, weakness of hip abductors and lateral rotators, weakness of Quadriceps, limited flexibility in Hamstring, Quadriceps, Gastro Soleus, Iliotibial Band, Medial and Lateral Retinaculum, joint laxity, patellar hypermobility, trauma, and excessive pronation of the foot. Due to the multifactorial etiology, the diagnosis and management of PFPS is difficult for novice as well as experienced clinicians. The lack of quality studies proving the effectiveness of clinical tests and lack of reliability of these tests necessitates further research into possible formation of cluster of clinical findings/tests to develop a diagnostic clinical prediction rule for the diagnosis of PFPS.

PO#80

EFFECTS OF A ONE-YEAR REHABILITATION PROGRAM INCLUDING MANUAL THERAPY ON FUNCTION, STRENGTH AND QUALITY OF LIFE OF ANKYLOSING SPONDYLITIS PATIENTS: A RANDOMIZED CONTROL TRIAL

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Background & Purpose Physical therapy is recognized as an important part of the management program in ankylosing spondylitis patients. The main goals are to improve patient's function, posture, muscle strength, fitness and pain. To date, there is no published data on the effect of a physical therapy program including manual therapy on trunk muscles strength in patients with ankylosing spondylitis. The purpose of this study was to assess To assess the effect of a one-year extended rehabilitation program (ERP) including manual therapy on function, strength and quality of life for ankylosing spondylitis (AS) patients stabilized with tumor necrosis factor (TNFα) blockers. **Methods:** Thirty-four patients were included in the study and assigned randomly in two groups. The study protocol was categorized into 3 phases: phase 1 (week 0 to 12) consisted in 2 sessions/week during 12 weeks of 30 minutes manual therapy treatment (MTP) combined with 30 minutes of trunk muscles strengthening. Phase 2 (weeks 12 to 18) and Phase 3 (weeks 18 to 52) consisted in a fitness program without MTP. The control group included eleven patients and received no rehabilitation program. The other 23 patients were included in the therapeutic group (TG). All TG's patients completed the 3 phases of the ERP. A blinded experimented physician performed functional assessments for each patient. These assessments consisted in trunk strength evaluation using Tergumed® devices (isometric measurement in the sagittal, frontal and horizontal planes). In addition, pain, stiffness and functional questionnaires (BASDAI, BASFI, HAQ) were collected as well. These parameters were assessed in both, before starting and at the end of the ERP. **Results:** TG had a significant increase of 11% ($p=0.0072$) for muscular strengths in flexion, 22% ($p=0.0216$) for left side bending and 20% ($p=0.0441$) and 21% ($p=0.0063$) for right and left rotations, respectively. BASFI, BASDAI and HAQ scores showed a significant improvement of 37% ($p=0.0158$), 36% ($p=0.0475$) and 50% ($p=0.030$), respectively. **Discussion-Conclusion:** An ERP including manual therapy improved functional parameters, strength and quality of life of patients with ankylosing spondylitis clinically stabilized with TNFα blockers.