

**AAOMPT Abstracts of Accepted Platform and Poster Presentations  
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PLATFORM #14

ABSTRACT ID: 2742870

**THE EFFECTS OF DRY NEEDLING ON MUSCLE FUNCTION AND FORCE PRODUCTION: A SYSTEMATIC REVIEW AUTHORS**

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**Background & Purpose:** Dry needling (DN) involves the insertion of a monofilament needle into various soft tissue structures in the body with the goal of decreasing neuromusculoskeletal pain and improving function. DN has been shown to decrease pain in the short-term; however, its effects on muscle function are unclear. The purpose of this systematic review is to determine whether DN is associated with enhanced muscle function and force production. **Methods:** An electronic search of PubMed, CINAHL and SPORTdiscus was performed from inception of these databases to October 25, 2016 using keywords related to “dry needling,” “muscle,” and “strength.” The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines were utilized at each phase of review. Two reviewers independently assessed eligible articles at each phase, and discrepant cases were resolved by the senior author. Quality of articles were appraised with the Physiotherapy Evidence Database (PEDro) scale and by the level of evidence as defined by the Oxford Centre for Evidence-Based Medicine. **Results:** A total of 1220 articles were identified after duplicates were removed and 36 articles were included in the final review. These included 15 randomized control trials, 11 cohort based studies, and 10 case reports. Scores on the PEDro scale ranged from 0 to 9 out of 10, with an average score of 5. Thirteen articles were deemed ‘high’ quality (>6/10). Nine of the articles were deemed ‘fair’ quality (5-6/10), and 14 were deemed ‘poor’ quality (<5/10). Thirty-one of the studies supported the use of DN to enhance muscle function and force production. **Discussion - Conclusions:** These results suggest that DN may enhance short-term muscle function and force production. Meta-analysis could not be performed due to variability in the methods of measurements, differences in DN technique, and heterogeneity of the study populations. Further research is needed to elucidate the long-term benefits of DN on muscle function, and which patients

may benefit from DN.

KEYWORDS: Dry Needling, Systematic Review, trigger point dry needling (TDN)

PLATFORM #36

ABSTRACT ID: 2742939

**ACCURACY OF CORACOHUMERAL LIGAMENT INJECTION USED FOR GLENO-HUMERAL ADHESIVE CAPSULITIS BY AN EXTENDED SCOPE MUSCULOSKELETAL PHYSIOTHERAPIST – A CADAVERIC CASE**

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**Background & Purpose:** Coracohumeral ligament (CHL) thickening with fibroplasia and associated limitation in range of motion are characteristic of glenohumeral idiopathic adhesive capsulitis (GHIAC). Corticosteroid injections are frequently utilized in the treatment of GHIAC. There is no consensus on the site of injection. Intra-articular glenohumeral joint injections have been advocated. No corticosteroid injection study has targeted specifically the CHL for GHIAC. This study demonstrated that the CHL can be accurately and safely infused by anterior approach from a Extended Scope Physiotherapist (ESP).

**Description:** An attempt was made initially to locate the CHL with musculoskeletal ultrasound (MSU) on the right shoulder of a 62 year-old male cadaver. A one-milliliter bolus of dye was subsequently injected under MSU guidance by an ESP trained in musculoskeletal injection techniques. Then, an anterior shoulder dissection was practiced and the dye was located directly anterior to the CHL. Using the information obtained from the MSU guided injection and subsequent dissection, anatomical land marks were determined for an unguided injection targeting the left CHL on the left shoulder. Feedback resistance indicated when the needle had reached/pierced the CHL and a bolus of dye injected. **Outcomes:** MSU and dissection subsequent to the unguided injection on the left shoulder demonstrated good location of the injected bolus immediately deep to the CHL and anterior to the glenohumeral joint capsule. **Summary of Use:** This study indicated that unguided and MSU guided injections can be carried out accurately and safely by a musculoskeletal ESP. The CHL can specifically be targeted with injections. This may represent a more specific option for GHIAC treatment, than intra-articular injections. The reduced cost and waiting times for musculoskeletal injections carried out by physiotherapists compared to those carried out by orthopaedic consultants can represent a timely and cost effective option.

KEYWORDS: Adhesive capsulitis, injections, glenohumeral joint

PLATFORM #15

ABSTRACT ID: 2743668

**ACCURACY AND SAFETY OF DRY NEEDLE PLACEMENT IN THE PIRIFORMIS MUSCLE IN CADAVERS**

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**Background & Purpose:** A concern with dry needling into the medial third of the piriformis muscle is accurate needle placement while avoiding sciatic nerve puncture. To date, no study has investigated the accuracy and safety of such a method. The purpose of this anatomic investigation is to (1) establish accuracy of dry needle placement into the medial third of the piriformis muscle as it exits the pelvis from the greater sciatic notch in unembalmed cadaveric specimens, while avoiding puncture of the sciatic nerve, and (2) establish guidelines for dry needle length selection. **Methods:** Dry needles were placed in nineteen unembalmed cadaveric posterior hips. Dissection of the posterior hip musculature was performed to confirm location of the needle. A binary decision (yes/no) was made to determine whether the needle reached the piriformis muscle, went through the piriformis muscle, and/or pierced the sciatic nerve. Additionally, mean adipose tissue thickness, gluteus maximus muscle thickness, and perpendicular distance from the needle to the exiting sciatic nerve were recorded. **Results:** The needle reached the medial third of the piriformis in 16 out of 19 hips (84.2% accuracy) and never punctured the sciatic nerve. There was a fair ( $r = 0.493$ ) and good ( $r = 0.759$ ) correlation between the needle length and the mean fat thickness for the left and right hips, respectively. **Discussion - Conclusions:** A musculoskeletal physical therapist was able to use bony landmark palpation to locate the piriformis muscle and use estimated adipose tissue thickness to choose a sufficient needle length to reach the medial third of the piriformis muscle. While the needle placement technique was safe and no sciatic nerve puncture occurred, the proximity of the piriformis muscle to the sciatic nerve warrants caution during needle placement. Future studies including performance of dry needling targeting the piriformis muscle in vivo are needed to increase external validity of the findings.

KEYWORDS: Dry Needling, piriformis syndrome, Trigger Point

PLATFORM #39

ABSTRACT ID: 2746844

**THE EFFECTS OF HIP LONG AXIS TRACTION THRUST MOBILIZATION ON HIP EXTERNAL ROTATOR MUSCLE STRENGTH: A PILOT STUDY**

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**Background & Purpose:** The hip external rotator muscles have been shown to be weaker in people with certain hip joint pathologies. Prior studies have demonstrated the effects of grade IV hip joint mobilizations on torque production of the hip abductor muscles and the gluteus maximus. However, the effect of thrust mobilizations on hip external rotator muscle force production is unknown. The purpose of this pilot study was to determine the immediate effects of hip long axis traction thrust mobilization on hip external rotator muscle isometric force production. **Methods:** Thirty healthy subjects [mean (SD): age 26.2 years ( $\pm 6.8$ ); 63% Female] were randomly assigned to a control group (n=15) (Grade I hip long axis traction, 30 sec. duration) or an experimental group (n=15) (Hip long axis traction thrust mobilization, 1-2 thrusts). Subjects lay prone in a standardized position. A secure belt and dynamometer (Commander, Jtech) were used to obtain maximal isometric hip external rotation force (N) before (pre) and immediately after (post) intervention for the right hip. Interventions were performed by a fellowship-trained physical therapist. Force readings were obtained by blinded collectors. Three measurements were obtained for each participant during both pre and post testing and the mean scores were utilized during data analysis. The t-test was utilized to examine within and between group differences in hip external rotation force with a priori alpha level of 0.05. **Results:** Following intervention, the experimental group demonstrated an 8.8% increase in hip external rotation force [mean (SD): pre 107.8 (33.7) vs. post 117.3 (34.1) N;  $p < 0.01$ ], whereas the control group only demonstrated a 2.3% increase [mean (SD): pre 96.3 (24.1) vs. post 98.5 (29.28) N;  $p = 0.37$ ]. There was a significant between group difference noted in the change of force production following intervention [mean (SD): experimental 9.5 (8.4) vs control 2.2 (9.2) N;  $p = 0.03$ ]. **Discussion - Conclusions:** This study provides preliminary evidence that hip long axis traction thrust mobilization can immediately improve hip external rotator muscle maximal isometric strength in healthy individuals. Future research examining the effects of this technique on muscle force production in people with hip joint pathology is needed.  
KEYWORDS: hip manipulation, hip strength

Poster #26:

**ESTABLISHING AN AAOMPT STUDENT SPECIAL INTEREST GROUP:  
SUCCESSSES, CHALLENGES, AND EARLY OUTCOMES.**

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**Background and Purpose:** The purpose of this abstract is to provide insight regarding student perspectives on the educational value of the implementation of an American Academy of Orthopedic Manual Physical Therapists (AAOMPT) local student special interest group (sSIG) within a Doctor of Physical Therapy (DPT) program. The AAOMPT sSIG started with the primary goal of providing further clinical education on OMPT topics to any student. Secondary goals included building a community of individuals with a shared interest, fostering involvement within AAOMPT, and connecting students with others that share similar interests. **Description:** The local sSIG was created in February 2017 and implemented its own unique guidelines, leadership structures, and meeting formats, among other aspects. A series of on-site meetings were scheduled and participants were surveyed. A single DPT cohort (n=53) completed an in-person, paper survey to gather feedback on their experience as part of the sSIG. Prior to the survey, three educational meetings were provided and all students were invited to participate. The survey was initially developed by the sSIG student officer board members and reviewed by content expert and AAOMPT faculty member. The 10-question survey was used to assess student perceptions of the educational and clinical aspects of the sSIG. **Results:** Several challenges were encountered during the initial steps of setting up the sSIG including finding common free time in the curricula that did not conflict with examinations or clinical experiences. Approximately 45% of the student body participated in the meetings. The survey yielded a response rate of 88.7%. The respondents (n=47) chose to attend the meetings for an additional opportunity to develop skills (64%, n=22) and having an interest in musculoskeletal content (17.6%, n=6). During the meetings, respondents reported new content delivered (76.5%, n=26). They would consider joining AAOMPT and/or attending the annual conference following participation in the meetings (73.5%, n=25). Additionally, they reported that they strongly agree that attending the meeting enhanced their understanding of musculoskeletal physical therapy (76%), perform examination and interventions psychomotor tasks (67%) and assisted in their ability to understand previously taught didactic information (65%). Interestingly, 93% (n=40) of all students who responded regardless of attendance reported that the presence of an sSIG enhanced their overall perception of the DPT program. **Discussion:** To our knowledge, this is the first report to detail the student perspectives regarding the formation and initial outcomes pertaining to having a sSIG. These findings indicate that a sSIG may be of value to the learning experience of DPT students and enhance the overall perception of the program.

**KEYWORDS:** Education, Student Experiences, Student Physical Therapist.

Platform #1:

ABSTRACT ID: 2755172

**OMPT FELLOWSHIP GRADUATES: A SURVEY OF PROGRAM IMPACT ON PROFESSIONAL ATTRIBUTES, CLINICAL SKILLS, SELF-PERCEPTION, AND INCOME**

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**Background & Purpose:** To describe fellowship graduate perceptions of the impact of their fellowship training on various professional attributes and clinical skills, self-perception of professionalism, and income. **Methods:** Graduates of a credentialed, hybrid-learning, multi-site OMPT fellowship program participated in an online survey asking about the impact of fellowship training on various professional attributes and clinical skills, self-perception of professionalism, and income. Respondents rated the impact of fellowship training on an 11-point Likert scale (1="Significant Negative Influence", 6="No Influence", 11="Significant Positive Influence") and they reported on the impact of training on their salaries and annual gross income. Frequency analyses and descriptive statistics were performed. **Results:** Seventy-five (97%) of 77 graduates completed the survey. They rated the impact of fellowship training on self-perception as a professional at 10.7(0.7). Mean scores for the ability to achieve optimal outcomes and to treat efficiently were 10.5(0.8) and 10.4(0.9), respectively. Mean score ranges for items in the clinical categories are as follows: 1) clinical reasoning-patient history: 10.3 (1.1)-10.7 (0.9); 2) clinical reasoning-physical exam 10.5 (0.8) - 10.7 (0.5); 3) clinical reasoning-interventions: 10.3 (1.0) - 10.6 (0.8); 4) clinical reasoning-discharge planning/prognosis: 9.9 (1.2) - 10.2 (0.9); 5) technical performance of manual therapies, exercise, and patient education: 9.6 (1.3) - 10.4 (0.8); 6) application of evidence-based practice, patient-centered practice, and biopsychosocial model of practice: 10.5 (0.9) - 10.6(0.8); 7) attributes of professionalism: 9.9 (1.3) - 10.4 (1.1); 8) areas of professional knowledge: 10.4 (1.1) - 10.5 (0.9). Twenty percent (n=15) of the graduates received raises in gross salary [x=\$6100 (\$6054)]; 59% (n=44) augmented their annual income through additional work, such as teaching or mentoring [x=\$9020(\$11123)]. Graduates reported that fellowship allowed them to increase total gross incomes an average of \$9560(\$17,545). **Discussion - Conclusions:** Graduate perceptions of the impact of fellowship training on their professional attributes and clinical skills were overwhelmingly positive, and graduates reported substantial increases in income as a result of their training. This information is important to all stakeholders involved in decision-making regarding fellowship training, especially for those who are considering investing significant time, effort, and financial resources into post- professional fellowship education.

KEYWORDS: Education, Fellowship, Value

Poster #28:

ABSTRACT ID: 2755966

**TEMPOROMANDIBULAR-SPECIFIC MANUAL THERAPY AND EXERCISE**

## FOR A PATIENT WITH NECK AND TMJ PAIN: A CASE REPORT

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**Background & Purpose:** Approximately 75% of the population experiences one symptom of temporomandibular disorder (TMD) at sometime in their life. Interdependent relationships between TMD and cervical pain have been suggested via the trigeminocervical nucleus and postural interactions; however, physical therapists may inadequately address TMD despite evidence in support of multimodal physical therapy (PT) intervention. The purpose of this case report is to describe the reasoning of an increased emphasis on the TM joint (TMJ) in a patient with primary cervical complaints. **Description:** A 77-year-old female presented with a four-week history of primary cervical (radiating) & secondary complaints of TMJ pain after a fall that included an impact on her chin. The clinical impression was multiregional involvement of the cervical spine and TMJ. Due to high reactivity and preference, interventions were initiated targeting the cervical spine, but marginally to the TMJ: manual therapy (joint-biased and muscle inhibition techniques) and exercise for each region. She experienced positive meaningful change in her cervical outcomes, but still had substantial TMJ complaints at Visit 6. Further assessment was performed resulting in increased dosage to the TMJ. **Outcomes:** Following the initial six visits, cervical flexion, extension, & rotation active range of motion (AROM) increased by 10°, 30°, & 40° respectively, however, no change in TMJ ROM was noted. Patient Specific Functional Scale (PSFS) score for all three activities (“looking up”, “turning her head”, “eating”) improved an average of 3.3 points (initial 2.7, final 6) (MCID = 2 points), while “eating” did not change. After three additional visits emphasizing the TMJ: PSFS improved by 6 points (initial 2.7, final 9) while “eating” improved by 6.5 points. TMJ AROM increased to 54 mm without pain (24 mm gain). She increased 20° in cervical flexion AROM. She achieved a normal Neck Flexor Endurance Test (initially unable), and normal cervical strength. Neck Disability Index score changed minimally (20% at final from initial 26%). Numeric Pain Rating Scale (7 day average) improved from an initial 5/10 to final 0/10. **Discussion - Conclusions:** Patients with primary complaints of cervical pain but also with TMJ functional limitations may require a more thorough examination with greater initial emphasis of interventions targeting the TMJ. This should include an early & adequate dosage of TMJ-specific manual therapy (joint and soft tissue-biased), coordination & neuromuscular inhibitory exercises. **KEYWORDS:** Manual Therapy, Temporomandibular Dysfunction, Neck Pain

POSTER #36:

ABSTRACT ID: 2756136

**APPLICATION OF A NOVEL TECHNIQUE IN MANUALLY STRETCHING THE PECTORALIS MINOR MUSCLE IN MANAGING PATIENTS WITH SUBACROMIAL IMPINGEMENT SYNDROME: A CASE SERIES**

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**Background & Purpose:** Subacromial Impingement Syndrome (SAIS) is the most common cause of shoulder pain. The pectoralis minor is gaining recognition to its relationship with SAIS by altering scapular posture and kinematics that may decrease the subacromial space due to tightness. This suggests stretching pectoralis minor when managing patients with SAIS. The purpose of this case series is to describe the application of a novel technique in manually stretching the pectoralis minor in patients with SAIS. **Description:** Three males and one female mean aged 43 years ( $\pm 19$ ) were diagnosed with SAIS and a symptom duration of 11 ( $\pm 5.5$ ) weeks. Baseline scores were: QuickDASH: 49 ( $\pm 3$ ), Patient Specific Functional Score (PSFS): 1.5 ( $\pm 0.4$ ), and Numeric Pain Rating Score (NPRS): 8 ( $\pm 0.1$ ). All present with decreased flexibility in the pectoralis minor. They received the following treatment twice a week for four weeks: (sidelying with painful side up): The physical therapist's (PT's) one hand was on the coracoid process and the other on the inferior angle of the scapula. PT's lower rib cage was against patient's upper rib cage. While maintaining all three points of contact, the patient took a deep breath and slowly exhaled while PT followed the patient's upper rib cage inferiorly with the PT's lower rib cage and locking it into place. Simultaneously, the PT applied a posterior, superior, external and upward rotation force on the scapula with both hands. The resulting stretch was held for 15 seconds and repeated five times. Patients were also treated using an impairment-based approach with exercises and other manual therapy appropriate to other regions to address overall poor, slouched, and forward head posture. Patients continued exercises at home for four more weeks after discharge. **Outcomes:** All patients improved. QuickDASH decreased to 24 ( $\pm 3$ ) at discharge and 6 ( $\pm 5$ ) at the four-week follow-up. PSFS increased to 7 ( $\pm 0.5$ ) at discharge and 9 ( $\pm 0.6$ ) at the four-week follow-up. NPRS decrease to 3 ( $\pm 0.5$ ) at discharge and 0.5 ( $\pm 0.6$ ) at the four-week follow-up. **Discussion - Conclusions:** Successful outcomes in function and pain after a course of physical therapy including this novel technique in stretching the pectoralis minor were noted in all four patients with SAIS. Results of this case series should be interpreted with caution as other factors may have contributed to the outcome. Further research is recommended to determine the effectiveness of this technique in patients with SAIS.

**KEYWORDS:** manual therapy, scapula, Impingement

POSTER #43:

ABSTRACT ID: 2756601

**MULTIMODAL TREATMENT OF CHRONIC ATRAUMATIC POSTERIOR THIGH PAIN: A CASE REPORT AUTHORS**

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**Background & Purpose:** Posterior thigh pain (PTP) is commonly associated with an injury of the hamstrings (HS). When HS injury has been ruled out, PTP is commonly assumed to be referred from proximal structures. Literature available for treating PTP that presents local to the middle and distal thirds of the thigh when HS injury and more proximal structures have been ruled out is scarce with regard to all intervention approaches. However, there is evidence indicating that a multimodal approach of pain neuroscience education (PNE), manual therapy (MT), therapeutic exercise (TE), and graded exposure (GE) may be effective for a variety of chronic pains. The purpose of this case report is to describe a multimodal treatment approach of a female with chronic, atraumatic PTP.

**Description:** The patient was a 19-year-old female student presenting with daily PTP located centrally in the middle to distal thirds of the right posterior thigh described as throbbing and stretching, but "difficult to describe." Symptoms onset insidiously one year prior to evaluation and were initially one-two days per week. At her first visit, PTP was more intense than at initial onset, restricting participation in all recreational activities. The pain was 4/10 on Numeric Pain Rating Scale (NPRS) with walking or standing longer than 10 minutes and stretching of the posterior leg. Pain decreased with rest. The patient had no significant medical history and no prior injury to the lumbar spine, hips, pelvis, or knees. Examination ruled out common causes of PTP (listed above). Only palpation and neurodynamic testing of the sciatic and tibial nerve replicated symptoms. Interventions utilized included PNE, soft tissue mobilization to the central, posterior thigh along the tibial and sciatic nerves, and lower extremity strengthening at every visit. Neurodynamic mobilizations and a graded exposure program were utilized in the clinic as well as at home. **Outcomes:** Following 13 visits over a nine-week period, the patient reported significant pain resolution, having only one instance of PTP at 1/10 on the NPRS within the two weeks prior to discharge. From evaluation to discharge, Lower Extremity Functional Scale score improved from 64/80 to 74/80 and right hip flexion, hip external rotation, and knee flexion all improved from 4/5, 4/5, and 4-/5, respectively, to 5/5.

**Discussion - Conclusions:** This case report demonstrated that a multimodal approach of PNE, MT, GE, and TE can result in significant improvements in pain and function for a young female patient with chronic PTP.

KEYWORDS: Pain Education, Neurodynamics, Multi-modal

POSTER #9:

ABSTRACT ID: 2758252

**RECOGNITION OF CERVICAL MYELOPATHY ASSOCIATED WITH  
RHEUMATOID ARTHRITIS: A COMPLEX PATIENT CASE REPORT**

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**Background & Purpose:** Rheumatoid arthritis (RA) is a progressive systemic disease associated with many long-term sequelae. Though patients have increased risks of sustaining a cardiovascular event, it is also important to note that the cervical spine is frequently involved in the course of RA. Detecting signs and symptoms consistent with cervical spinal cord pathology is critical for prevention of permanent neurological injury. The purpose of this case report is to describe a student physical therapist recognition and post-surgical management of a patient initially diagnosed with an acute stroke, who was also discovered to have significant cervical myelopathy. **Description:** A 76-year-old woman with RA had been referred for a physical therapy evaluation and management of acute stroke. The patient's brain magnetic resonance imaging (MRI) revealed a small subacute cortical infarct in the right parietal lobe. Inconsistencies with an acute stroke diagnosis were noted: numerous bilateral neurological signs, prior history of bowel and bladder incontinence and a significant prior history of falls. Suspicion of cervical involvement was communicated to the interdisciplinary team. Shortly thereafter, a cervical MRI revealed significant multilevel degenerative disc disease, facet arthropathy, foramina narrowing, and canal stenosis with likely myelomalacia at the C5-C6 level. Immediate referral was made to a neurosurgeon, and soon afterwards the patient underwent a C3-C7 posterior decompressive laminectomy surgery as well as C4-C5 fusion to attend to the radiographic findings of cervical instability. **Outcomes:** During the post-surgical episode of care, the patient was in the acute inpatient rehab facility for 23 days where she was able to: decrease her dependence on caregivers, ambulate 12 feet using a fixed wheeled rolling walker, and achieve 7/11 of her physical therapy goals. The patient was eventually discharged to a skilled nursing facility to further continue rehabilitation of her functional independence. **Discussion - Conclusions:** Patients with RA may present with different patterns of cervical instability. In this case, detailed medical screening, history taking, and examination deemed the patient inappropriate for physical therapy intervention and necessitated another healthcare provider.

KEYWORDS: Myelopathy, Differential Diagnosis, Imaging

POSTER #6:

ABSTRACT ID: 2759247

**ORTHOPEDIC MANUAL PHYSICAL THERAPY MANAGEMENT OF A PATIENT WITH A DISPLACED CLAVICULAR FRACTURE: A CASE REPORT**

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**Background & Purpose:** Little evidence exists to guide decision-making regarding physical therapy management of a patient with a displaced clavicular fracture. Previous literature compares immobilization to surgical pinning without the use of physical therapy during fracture healing. Patients with displaced midshaft clavicular fractures have been shown to have residual limitations in strength, endurance, and reported function. This case report is designed to describe the management of a patient with a displaced fracture. **Description:** A 34-year-old male was referred to physical therapy following a traumatic middle 1/3 displaced clavicular fracture. His complaints were Numeric Pain Rating Scale of 8/10 with movement of his left shoulder. Subjectively, he described sharp anterior shoulder pain and fear with movement. Initial outcome measures were Shoulder Pain and Disability Index (SPADI): 83% and the Shortened Disabilities of the Arm, Shoulder and Hand Score (QuickDASH): 53. Physical examination revealed limitations in left shoulder elevation and rotation, both, actively and passively. He demonstrated impairments in rotator cuff (RC) and periscapular strength contributing to scapular dyskinesia. Hypomobilities in glenohumeral (GH) joint and thoracic spine (TS) were also appreciated. Manual therapy (MT) interventions were utilized to treat these impairments of the GH, TS, and scapula via joint mobilizations and soft tissue mobilizations. Additionally, strengthening and neuromuscular control exercises were incorporated to improve shoulder function. **Outcomes:** The patient was seen for ten visits over 43 days. Range of motion, pain and function all demonstrated meaningful clinical changes as noted through goniometry, SPADI and QuickDASH respectively. Additionally, he demonstrated functional strength in positions necessary to return to recreational bow hunting that was maintained at 2-month follow-up. Radiographic imaging revealed the fracture to be fully healed with no signs of malunion. **Discussion - Conclusions:** Clinically meaningful improvements in function and pain were demonstrated following orthopedic MT management directed to the GH joint, TS, scapulothoracic joint, and posterior RC. Additionally, education and goal specific upper quarter strength and proprioceptive exercises were utilized. This case report demonstrates the use of MT and exercise for the conservative management of a displaced clavicular fracture. Future research should investigate similar management strategy in larger sample size compared to immobilization alone.

KEYWORDS: Shoulder, case report, Clinical Reasoning

PLATFORM #44

ABSTRACT ID: 2760054

### **BREAKING DOWN BARRIERS WITH ONLINE INTERNATIONAL CLINICAL MENTORING FOR PHYSICAL THERAPISTS**

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**Background & Purpose:** Clinical mentoring is important to support novice physical therapists whom often face insecurities with challenging patient populations, such as patients with spinal pain. However, many physical therapists do not have access to a clinical mentor. Research exploring innovative mentoring strategies to reduce barriers and enhance learning is needed.

Therefore, the objective of this study was to examine the effects of providing online clinical mentoring to small international groups of novice clinicians treating patients with spinal pain in the outpatient setting. **Methods:** Eleven novice and four expert clinicians participated and were divided into international groups of one clinical expert and three novice clinicians. Four one-hour group video-conference mentoring sessions were held in which each novice clinician presented a case study. Data were collected from pre- and post-participation surveys and post-participation focus groups. Data were analyzed using a phenomenological approach. **Results:** Four themes emerged from the novice qualitative data: improved confidence, enhanced critical thinking, appreciation of the structured design and accessibility to peers and mentors. Two themes emerged from the expert data: value of the model and viability. Expert clinicians found value in this mentoring model filling a need within the profession and in being viable on its own or as part of an educational program. **Discussion -**

**Conclusions:** Online small group international clinical mentoring appears to be an effective strategy to break down the typical barriers to accessing clinical mentoring. Clinical mentoring was demonstrated to promote confidence and critical-thinking skills in novice physical therapists working with patients with spinal pain. This research provides a viable model that increases accessibility to clinical mentors and fills a need within the profession.

KEYWORDS: Education, confidence, Internationalization

PLATFORM #33

ABSTRACT ID: 2760191

**RELIABILITY AND CONSTRUCT VALIDITY OF THE FEAR-AVOIDANCE BELIEFS QUESTIONNAIRE IN PATIENTS WITH CHRONIC SHOULDER PAIN AUTHORS**

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**Background & Purpose:** The Fear-Avoidance Beliefs Questionnaire (FABQ) contains both physical activity (FABQPA) and work (FABQW) subscales. Although fear avoidance beliefs as measured by the FABQ have been shown to correlate with the SPADI pain and disability scores it has not been determined what the FABQ is measuring. If the FABQ activity and work subscales are related to SPADI pain and disability scales and if the SPADI pain and disability scales have been shown to be correlated to the numeric pain rating scale (NPRS) it is quite possible that the FABQ is a measure of pain in the absence of fear. The purpose of this study was to determine: (1) the test-retest reliability of FABQW, FABQPA, SPADI Pain subscale, SPADI Disability Subscale and NPRS; (2) the relationship between the FABQPA, FABQW, SPADI pain, SPADI disability, and NPRS at the initial evaluation and at 4 weeks after pragmatically applied PT to the shoulder; (3) if the FABQW, FABQPA, SPADI pain, SPADI disability, and NPRS change in response to pragmatically applied PT over 4 weeks. **Methods:** This study was a prospective, single-group observational design. Data were collected at initial evaluation, the first follow-up visit prior to the initiation of treatment, and after 4-weeks of treatment. **Results:** Statistically significant ICC<sub>2,1</sub> values were 0.43 (-0.12-0.71) for the FABQPA, 0.95 (0.91-0.98) for the FABQW, 0.94 (0.88-0.97) for the SPADI Pain subscale, 0.92 (0.84-0.96) for the SPADI Disability subscale, and 0.88 (0.77-0.94) for the NPRS. Statistically significant differences were observed between the initial evaluation and four-week follow-up for the FABQPA, SPADI Pain, SPADI Disability, and NPRS ( $p < 0.01$ ) that were not observed for the FABQW ( $p = 0.70$ ). At the initial evaluation, statistically significant correlations were observed between the FABQPA, SPADI pain and SPADI disability scales which were all less than 0.50. At the 4-week follow-up statistically significant correlations were observed between the FABQPA, SPADI pain and SPADI disability subscales, and NPRS, which were also less than 0.50. The only statistically significant correlation observed at the 4-week follow-up that may be meaningful was  $r_s = 0.50$ ,  $p < 0.01$  between the FABQW and the NPRS. **Discussion - Conclusions:** In the context of chronic shoulder pain, fear avoidance behavior related to activity, function related to the SPADI, and pain as measured by the NPRS may improve without any improvement in fear avoidance related to work. This study suggests that the FABQW may not change over time. **KEYWORDS:** Fear-Avoidance Beliefs, Shoulder Pain, Pragmatic

POSTER #22

ABSTRACT ID: 2761007

**APPLICATION OF MECHANICAL DIAGNOSIS AND THERAPY IN THE MANAGEMENT OF A FEMALE WEIGHTLIFTER WITH SHOULDER PAIN**

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**Background & Purpose:** Shoulder pain is a common musculoskeletal disorder in weightlifters. Mechanical diagnosis and therapy (MDT) is a reliable classification system based on the patient's response to repeated movements or sustained positions. The purpose of this case report is to describe a recreational weightlifter with shoulder pain using MDT principles. **Description:** A 29-year-old female presented with insidious onset of right anterior shoulder pain, worsening over the past two months. She had recently engaged in a progressive weight-training regimen. Her intermittent pain ranged from 0-6/10 on the Numeric Pain Rating Scale (NPRS), that limited reaching overhead, donning/doffing her shirt, and sleeping on her right side. Initial QuickDASH score was 39. A screening examination of the cervicothoracic spine was negative. The patient exhibited limited and painful flexion and abduction active range of motion (AROM) and overpressure. Resisted testing revealed weak and painful abduction and external rotation. Hawkins-Kennedy test was positive. Repeated movement testing of shoulder extension with forearm pronated was tested first based on clinician experience. A foam roller was held in both hands to achieve a passive stretch using force applied by her contralateral upper extremity. This position was held for three seconds and then returned to neutral. The patient was encouraged to push further towards end range extension with each repetition. NPRS improved from 6/10 to 3/10 at Visit One and her active elevation increased by 10°. This confirmed shoulder derangement with directional preference of shoulder extension. She was instructed to perform 15 repetitions of extension, 5-6 times per day. Progression of forces, including clinician overpressure, were used to achieve end-range shoulder extension. **Outcomes:** In five visits, full ROM, strength and function were 100% WNL of her contralateral shoulder. The Hawkins- Kennedy test became negative by discharge. QuickDASH score was 3. GROC score was +7. NPRS was 01/0 at an eight-week phone follow-up. The patient returned to her weight training regimen pain-free. **Discussion - Conclusions:** This case report details the classification and successful management of a weightlifter utilizing the principles of MDT. During the physical exam, repeated movements were used to classify her condition by an examiner who had completed MDT Part A-D. Clinical reasoning may improve with advanced training, though further research is warranted. **KEYWORDS:** Shoulder Pain, directional preference, Mechanical Diagnosis and Therapy

PLATFORM #20

ABSTRACT ID: 2761303

**AN IMPAIRMENT-BASED APPROACH TO ADDRESS THORACOLUMBAR JUNCTION SYNDROME WITH RESOLUTION OF PRESENTING VISCERAL SYMPTOMS: A CASE REPORT**

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**Background & Purpose:** Thoracolumbar junction (TLJ) syndrome involves dysfunction in the transitional area from T10-L2 and can present as pain in the low back, hip or abdomen (pseudovisceral pain). The pancreas can be another source of upper abdominal pain and also may refer to the low back. Limited evidence exists to describe physical therapist management of TLJ syndrome, or of patients with visceral symptoms. The purpose of this case report is to describe a multi-modal treatment of TLJ syndrome with concurrent resolution of apparent visceral symptoms. **Description:** The patient was a 41-year-old female with a history of cholecystectomy and pancreatitis leading to two weeks of bed rest and onset of left thoracic pain. She developed pancreas pseudocysts resulting in endoscopic shunt drainage, but continued to report abdominal symptoms. She presented three weeks after this with severe left lower thoracic and posterior hip pain, constant left upper abdominal “burning”, and decreased appetite. On physical exam: Numeric Pain Rating Scale (NPRS) was 8/10 at worst in abdomen after eating, 9/10 at worst in thoracic after prolonged sitting/standing or movement; Oswestry Disability Index(ODI) was 42%. Allodynia present at left (L) T8-L2. L thoracolumbar rotation and side bend was limited by thoracic pain. She had visible upper thoracic movement during breathing. Segmental mobility testing T10-L1 reproduced L hip and abdominal pain, but was not her concordant “burning.” Initial treatment consisted of desensitization techniques, isometric exercise, and soft tissue mobilization. After two visits, the patient was able to tolerate high/low velocity joint mobilization targeting the TLJ followed by diaphragmatic breathing and advancement of stabilization exercises. **Outcomes:** After three treatments including manual therapy at the TLJ, the patient reported improved appetite and abdominal pain that was “a great deal better”( +6 on Global Rating of Change), NPRS 4/10 at worst and ODI to 30%. After thirteen visits over nine weeks, the patient was able to return to work, eat her typical diet, and perform her usual activities with minimal symptoms. **Discussion - Conclusions:** In this case manual interventions combined with specific exercises targeting the TLJ region were successful in the resolution of presenting impairments. The inclusion of Physical Therapist management as part of a multi-disciplinary team may be appropriate for some patients’ visceral symptoms and should be considered primary for TLJ impairments. Future research should continue to explore these potential relationships.

**KEYWORDS:** Thoracolumbar Manipulation, abdominal, Physical Therapy

POSTER #46:

ABSTRACT ID: 2761490

**IDENTIFYING AND EXAMINING ANKYLOSING SPONDYLITIS IN THE PRESENCE OF MUSCULOSKELETAL PAIN COMPLAINTS: A CASE REPORT**

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**Background & Purpose:** Ankylosing spondylitis (AS), an inflammatory rheumatic disease, may present clinically with spinal pain and stiffness. Thus, performing a detailed history to identify specific pain patterns is essential. The purpose of this report is to explain how one case of AS discovered after discharge from physical therapy (PT) helped guide reflection & clinical decisions in a subsequent undiagnosed case of AS. **Description:** Case 1: A 35-year-old male presented with a 2-year history of low back pain (LBP) and pain/stiffness with standing & walking. At evaluation his pain was 5/10 on the Numeric Pain Rating Scale (NPRS). Function was limited: Lower Extremity Functional Scale (LEFS) was 70/80; Oswestry Disability Index (ODI) 14%. Normal & pain free lumbar active range of motion (AROM) and hypermobile L5 were demonstrated. A positive Ely's on the right (R) with poor transversus abdominus (TrA) & lumbar multifidi (LM) activation were noted. Treatment included TrA/LM training & pelvic-hip dissociation exercises. Case 2: A 26-year-old female presented with a one-year history of thoracic pain, with pain/stiffness during the second half of sleep that was alleviated with walking. Intermittent pain was irrespective of exertion. At evaluation her pain was 8/10; ODI of 34%. She demonstrated limited & painful thoracic extension AROM, hypomobile T2-T7. Treatment included manual therapy to thoracic spine with concurrent referral back to physician for AS work up. **Outcomes:** Case 1: Five PT visits in 5 months were completed. At discharge, pain & functional limitations persisted: NPRS: 5/10, ODI 22%. Patient contacted PT 2 months later to report a diagnosis of AS (imaging demonstrated sacroilitis; positive HLAB 27 antigen). PT re-evaluation performed: complaints included stiffness/pain in AM that improves with movement, decreased R hip extension passive ROM, & thoracic hypomobility. He was educated on a home exercise program. Case 2: Three PT visits in two weeks were completed. At discharge pain and functional limitations persisted: NPRS: 7/10, ODI 228%. Rheumatologic work up revealed (+) HLA B27 antigen, with physician diagnosis of AS. She self-discharged from PT with medical management. **Discussion - Conclusions:** The diagnosis of AS in Case 1 was a clinical learning experience that ultimately led to an appropriate referral & diagnosis in Case 2. This case report is an example of how previous patient outcomes contribute to advancing clinical expertise and improving the important triage skills needed as a direct access practitioner.

KEYWORDS: Musculoskeletal Pain

POSTER #13:

ABSTRACT ID: 2762678

### **NON-THRUST MOBILIZATIONS TO THE THORACIC SPINE AND RIBS FOR TREATMENT OF SHOULDER PAIN: A CASE REPORT**

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**Background & Purpose:** Shoulder impingement syndrome (SIS) is a common diagnosis with recovery rates ranging from 49% to 59%. Regional interdependence posits that deficits in one area can result in impairments in another. Prior studies have demonstrated the benefit of thoracic spine (TS) and cervical spine thrust manipulation for treatment of SIS, but no investigators have assessed the effectiveness of TS non-thrust mobilizations for treatment of SIS. The purpose of this case report is to discuss the clinical reasoning related to a regional interdependence approach utilizing TS and rib non-thrust mobilizations for an individual with SIS. **Description:** A 47-year-old male experienced four months of left shoulder pain during overhead tasks, bench and military press exercises, and when pushing open heavy doors. Prior to physical therapy (PT), treatment provided by his physician included a cortisone injection into the left subacromial space and a home exercise program that emphasized shoulder external and internal rotation strengthening and pectoralis muscle stretching. Evaluation findings were consistent with SIS, TS and rib hypomobility, and altered scapular positioning. Non-thrust mobilizations (grades III & IV) were utilized during six PT visits. These were: supine mobilizations to C7-T8, prone mobilizations to T1-8, and prone posterior-to-anterior mobilizations to left ribs 4 – 7. Additionally, a progressive exercise program was utilized to reinforce manual therapy and address scapula impairments. **Outcomes:** The patient had reduced pain with all overhead tasks and exercises, as well as improved posture and scapular positioning. His 8/10 pain rating on the Numerical Pain Rating Scale at the initial evaluation reduced to 1/10. He also had a reduction on the QuickDASH and sports/performing arts subscale from 11.36 and 31.25 impairment, respectively, at evaluation to 0 impairment at discharge. **Discussion - Conclusions:** Use of non-thrust mobilizations to the TS and ribs contributed to the successful improvements in shoulder pain and function for this patient. This case report describes the importance of evaluating and treating adjacent body regions as part of a comprehensive plan of care. Future research should explore the difference in response between non-thrust mobilizations and thrust manipulation of the TS and ribs to treat SIS.

KEYWORDS: REGIONAL INTERDEPENDENCE, Non-thrust, shoulder pain

POSTER #3:

ABSTRACT ID: 2765101

**COLLABORATIVE APPROACH IN THE DEVELOPMENT AND UTILIZATION OF A PATIENT-CENTERED POST-OPERATIVE ACHILLES TENDON REPAIR PROTOCOL: A CASE REPORT**

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**Background & Purpose:** Rising Achilles tendon rupture rates are estimated at 18 ruptures per 100,000 individuals per year. Of these, 20% of do not return to play. This suggests the need for improved rehabilitation approaches. Post-operative rehabilitation following Achilles tendon repair, often based on known tissue healing timeframes, have been criticized as "cookbook" in nature. The purpose of this case report is to describe the development of a patient-centered post-operative protocol for a patient who had a goal of returning to Crossfit™. **Description:** A 37-year-old male ruptured his Achilles tendon while jumping rope and subsequently had an Achilles Midsubstance Speedbridge repair four weeks prior to initial physical therapy (PT) evaluation. The patient's goals included returning to Crossfit™ workouts. A post-operative protocol was developed through collaboration with the referring surgeon and patient. Modifications were made to the existing protocol and categorized into three phases. In phase 1, primary impairments were noted, including decreased range of motion, increased edema, increased muscle turgor and pain with full weight bearing (WB) Phase 1 goals were to protect the repair, reduce edema/pain, and improve WB tolerance. At phase 2, initiated 7 weeks post operatively, the patient demonstrated impaired basic movement patterns including heel to toe gait and decreased gastrocnemius/soleus (GS) complex force production. Phase 2 goals included achieving 10° dorsiflexion and an uncompensated gait pattern. At phase 3, initiated 13 weeks post operatively, the patient demonstrated decreased GS force production in single limb stance and poor eccentric control. Phase 3 goals included return to Crossfit™ activities. **Outcomes:** Self-report measures were Foot and Ankle Ability Measure, Achilles Tendon Total Rupture Score, and Patient Specific Functional Scale. Performance Measures were 10-meter walk, single leg stance time, and number of successful single leg heel raises. In 15 treatment sessions over 14 weeks, the patient demonstrated clinically meaningful improvements all measures. The patient returned to all Crossfit™ activities. **Discussion - Conclusions:** This case report describes the plan of care progression guided by the patient-centered post operative protocol based on collaboration between the referring surgeon, the PT, and the patient resulted in a guided approach to treatment. Patient centered protocols associated with successful outcomes warrants further systematic study.

**KEYWORDS:** Achilles Tendinopathy, Surgery

PLATFORM #40

CONTROL ID: 2766901

### **IMMEDIATE CHANGES IN QUADRICEPS MUSCLE FUNCTION FOLLOWING MANUAL THERAPY: A CASE SERIES**

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**Background & Purpose:** Neuromuscular alterations, including decreased quadriceps muscle function, are common in patients with knee osteoarthritis (OA). The physical therapy approach to the treatment of knee osteoarthritis decreases pain, improves function, changes end range rotational stiffness, improves gait parameters, and reduces the incidence of total joint replacement. The purpose of this study was to quantify baseline quadriceps function and summarize changes in patients with knee OA following a single session of manual physical therapy treatment. We hypothesized that manual physical therapy directed at the knee and surrounding structures would influence quadriceps neuromuscular function. **Description:** Patients presenting to physical therapy with symptomatic knee OA were treated in a single session of impairment based joint and soft tissue mobilizations accompanied by reinforcing exercise. Subjective pain assessment, peak torque and surface EMG data from the quadriceps and hamstrings were obtained during knee extension contractions while positioned in 60 degrees of knee flexion and then again in terminal knee extension. Outcome measures were collected at baseline and immediately after the 30-minute manual physical therapy treatment session. **Outcomes:** Five patients (mean age  $61.8 \pm 4.5$  years; 2 male) with symptomatic knee OA (mean duration  $60.4 \pm 102.2$  months; mean WOMAC  $104.4 \pm 43.4$ ) were included. Compared to baseline EMG, improvements were seen in mean amplitude for the vastus medialis ( $p=0.03$ ; mean change  $23.8 \text{ mV} \pm 17.6$ ) and rectus femoris ( $p=0.05$ ; mean change  $14.3 \text{ mV} \pm 11.5$ ) during contractions in terminal knee extension. Pre to post intervention comparisons of the isometric contractions demonstrated improvement in peak torque ( $14.6 \text{ Nm} \pm 17.8$ ) and mean amplitude of the rectus femoris ( $22.41 \text{ mV} \pm 45.2$ ), though both failed to reach statistical significance. **Discussion - Conclusions:** After a single session of manual physical therapy directed at the knee joint, we observed improvement in quadriceps function in participants with knee OA. These results, though limited, provide insight into the disinhibitory influence manual therapy may have on the quadriceps musculature. The observed changes in neuromuscular function suggest manual physical therapy treatment may be useful to address quadriceps muscle dysfunction in people with knee OA.

**KEYWORDS:** Knee osteoarthritis, Manual Therapy, Quadriceps activation

PLATFORM #23

ABSTRACT ID: 2766963

**THE ROLE OF CLINICIAN DECISION MAKING IN RANDOMIZED CLINICAL TRIALS COMPARING MANIPULATION VS. MOBILIZATION WHEN TREATING MECHANICAL NECK AND LOWER BACK PAIN: A SYSTEMATIC REVIEW AND META-ANALYSIS**

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**Background & Objective:** Many studies have compared the effectiveness of mobilization versus manipulation for neck and low back pain. However, the results have been conflicting. One possible reason is that studies vary in design from pragmatic (clinician has a choice in which segment to target and which techniques to use) to prescriptive (clinicians are told which segments to target and techniques to use). The purpose of this systematic review and meta-analysis was to examine the role of clinician decision making (pragmatic vs. prescriptive) in randomized clinical trials comparing manipulation vs. mobilization when treating mechanical low back and neck pain. **Methods:** This systematic review and meta-analysis was performed according to the PRISMA guidelines. A literature review of MEDLINE and CINAHL complete databases was performed. Article titles and abstracts were reviewed to identify relevant articles comparing mobilization and manipulation in low back or neck pain that met eligibility criteria. Studies were then classified as pragmatic or prescriptive. To be defined as pragmatic, clinicians needed to be able to choose the technique and spinal levels to be treated. If both of these criteria were not met, the study was rated as prescriptive. Methodological quality of included studies was examined using the Cochrane Risk of Bias tool. Data analysis was performed using RevMan (The Nordic Cochrane Centre, The Cochrane Collaboration, Copenhagen, Denmark). After data analysis, forest plots were constructed to determine effect size. **Results:** Thirteen studies with a total of 1,313 participants were identified and included in the systematic review, with 12 studies with 977 participants in the meta-analysis. The mean score on the Cochrane risk of bias tool across all 8 prescriptive studies was 67.97% and for all five pragmatic studies was 53.75%. For pain outcomes, prescriptive manipulation proved to have a significantly larger effect size (0.77 95% CI: 0.62-0.91) than prescriptive mobilization. For disability outcomes, prescriptive manipulation proved to have a significantly larger effect size (0.72 95% CI: 0.55- 0.88) than prescriptive mobilization. **Discussion:** When clinician choice was involved, no difference was observed between mobilization and manipulation. When clinicians were prescribed techniques, manipulation showed better outcomes than mobilization for both pain and disability. In the future, more high quality studies are needed in order to draw more definitive conclusions.

KEYWORDS: Mobilization, Manipulation, Manual Therapy

PLATFORM #24

ABSTRACT ID: 2767353

**MANAGEMENT OF CHRONIC AUDITORY SEQUELAE AND ASSOCIATED CERVICO-FACIAL IMPAIRMENTS WITH A MULTI-MODAL APPROACH IN**

## **ORTHOPEDIC MANUAL PHYSICAL THERAPY: A CASE REPORT**

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**Background & Purpose:** Aural sequelae such as pulsatile tinnitus, middle ear myoclonus and otalgia have been associated with temporomandibular joint dysfunction (TMD). Trauma to the cervical spine has also been associated with the development of or comorbidity with TMD. The purpose of this case report is to describe the successful, multi- interventional management of a patient with four-year complaint of auditory symptoms and TMD following a motor vehicle accident (MVA). **Description:** A 48-year-old male presented with left-sided shoulder, neck and jaw pain which started after a MVA in 2013. He began having a thumping/spasmodic sensation inside the left ear approximately one week following the trauma. These aural symptoms were aggravated by cervical extension, presence of neck pain, and lying down to sleep. He presented with multi-level cervical segmental dysfunctions coinciding with imaging reports of C5-7 disc pathology. His jaw opening was painful and restricted to 30 mm. He presented with hypertonicity of masseters, sternocleidomastoid, scalenes, temporalis and upper trapezius muscles. Initial Neck Disability Index (NDI) was 38%. Initial QuickDASH was 25. A neurologic screen revealed weak left C7 myotome and 1+ triceps deep tendon reflex. Numeric Pain Rating Scale (NPRS) for worst/best/average (W/B/A) was 6/3/3 (out of 10) for the neck and jaw. The patient was treated using a combination of manual therapy techniques addressing soft tissue dysfunctions in the cervico-craniofacial region, both intra- and extra-orally. High velocity and muscle energy techniques targeted thoracic and cervical joint mobility dysfunctions. Dry needling, cupping, and kinesiotaping were used to diminish myofascial restrictions and hypertonicities. Therapeutic exercise addressed scapulothoracic stability, craniocervical motor control and thoracic spine mobility. Finally, therapeutic neuroscience education for pain management was delivered, given the chronicity of his symptoms. **Outcomes:** After four visits the patient's NDI improved to 20%. The QuickDASH improved to 9. His aural symptoms were absent with cervical extension and lying down. His jaw opening increased by 20 mm. Neurologic retesting was bilaterally symmetric. NPRS for W/B/A reduced to 3/0/1 (out of 10) for his neck and jaw. **Discussion - Conclusions:** This case report highlighted the opportunity a multi-modal orthopaedic manual physical therapy approach can serve in addressing combined presentations of chronic auditory sequelae and neuromusculoskeletal impairments secondary to trauma. **KEYWORDS:** Temporomandibular Joint Dysfunction, Cervicothoracic, chronic pain

PLATFORM #19

ABSTRACT ID: 2767743

**THRUST AND NON-THRUST MOBILIZATION AS AN ALTERNATIVE TO**

## **ECCENTRIC EXERCISE IN THE MANAGEMENT OF ACHILLES TENDINOPATHY: A CASE REPORT**

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**Background & Purpose:** Achilles tendinopathy (AT) is a common sporting injury; however, anywhere from 30% to 65% of cases occur in sedentary patients. While the pathoetiology and risk factors for developing AT are heterogeneous in nature, recommended treatment options are not. Eccentric exercise is the only treatment option strongly supported in the literature. A singular treatment approach to a pathology with heterogeneous etiology and risk factors could explain why 29% of patients with AT progress to surgical intervention. Manual therapy has been demonstrated to be effective in other tendinopathies but not explored in AT. The purpose of this case report was to describe the successful management of an elderly sedentary patient with AT using thrust and non-thrust manipulation. **Description:** A 68-year-old female, diagnosed with right (R) AT presented with an intermittent superficial ache and pulling at the posterior ankle pain, which started insidiously six months prior while walking. Walking at fast speeds, stair negotiation, getting up from prolonged sitting or sleeping aggravated her pain. Pertinent examination findings included: excessive pronation, calcaneal eversion, and abduction of the mid-foot bilaterally (right more than left), antalgic gait, palpable thickening of R AT tendon, reproduction of her familiar pain with R unilateral heel raises, limited R dorsiflexion, and hypomobility with anterior to posterior (AP) glide at the talocrural joint as well as medial and lateral glides of the R subtalar joint. Both thrust and non-thrust mobilization directed at joint hypomobilities were used. Her home exercise program included walking, stretching, and self-mobilization. **Outcomes:** Following eight visits gait speed increased by 0.22 m/s. Patient Specific Functional Scale score for walking and negotiating stairs increased from an initial 2/10 to 9/10 and 10/10 respectively. Focus on Therapeutic Outcomes score increased from 46/100 to 83/100. Numeric Pain Rating Scale score while walking decreased from 5/10 to 0/10. She reported a +7 on the Global Rating of Change. These gains were maintained at a six-month consultation. **Discussion - Conclusions:** This case demonstrates the successful use of thrust and non-thrust mobilization as the primary intervention in an elderly sedentary person with AT. Alternative interventions to eccentric exercise such as MT need to be examined as an intervention for AT as it appears to be safe, effective, and may accelerate the rehabilitation process.

**KEYWORDS:** Achilles Tendinopathy, Manual Therapy, Eccentric Exercise

POSTER #5:

ABSTRACT ID: 2768813

**MANAGEMENT OF A PATIENT WITH MULTIPLE SCLEROSIS PRESENTING**

## **WITH NECK PAIN, SHOULDER PAIN AND UPPER EXTREMITY WEAKNESS IN THE PRESENCE OF ALTERED CERVICAL SPINE PROPRIOCEPTION: A CASE REPORT**

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**Background & Purpose:** Studies have indicated that patients with a history of neck pain demonstrate delayed activation of deep neck flexors & craniocervical flexors (DNF & CCF) with upper extremity (UE) use. Delay in response may contribute to clinical instability of the cervical spine and UE impairment. Facilitated paraspinal musculature has been successfully managed with dry needling (DN) & intramuscular electrical stimulation (IES). The purpose of this case report was to outline the clinical decision making with a primary focus to increase cervical spine proprioception and DNF/CCF endurance/activation in a patient with an underlying neurological condition. **Description:** A 29-year-old male, diagnosed with Multiple Sclerosis (MS) nine months prior, presented with a six-year history of right (R) side cervical spine and R shoulder pain, that were progressing with frequency & duration after diagnosis. In addition, he reported onset of worsening R shoulder weakness. Neck Disability Index (NDI) was 26%, QuickDASH was 56, and Quadruple Visual Analog Scale (QVAS) was 37%. Weakness was present in R C5 & C6 myotome distribution. He displayed poor DNF/CCF endurance/activation. Joint Position Error Test (JPET) of the cervical spine testing showed poor proprioception. Treatment included: DN & IES of suboccipitals and cervical spine multifidi associated with myotomal weakness, manual therapy (MT) (thrust and non-thrust mobilization) to the cervical spine and upper ribs, DCF/CCF strengthening, proprioceptive training, range of motion exercises, and postural education. **Outcomes:** After four visits over the course of three weeks, his NDI was 2%, QuickDASH was 0, and his QVAS was 10%. Strength testing of the right shoulder region was normal. DCF endurance improved. Average area covered by visual tracking markers in JPET at baseline was 114.6cm<sup>2</sup>; at discontinuation of treatment 5.12cm<sup>2</sup>, a 96% reduction. **Discussion - Conclusions:** A patient that presented with neck pain with coordination deficits and UE complaints in the presence of an underlying progressive neurological disorder was successfully managed with a multimodal approach that included MT, DN and exercise over a short duration of care. This case report demonstrates the importance of addressing cervical proprioception in the presence of neck pain and upper extremity pain and weakness. Future research investigating the inclusion of DN & IES with to treatment of coordination deficits and/or peripheral weakness is needed to validate its effect on outcomes in patients with MS.

**KEYWORDS:** Multi-modal, Dry needling, Clinical Reasoning

PLATFORM #16

ABSTRACT ID: 2769602

**DRY NEEDLING FOR A PATIENT WITH ACUTE LOW BACK PAIN SATISFYING THE CLINICAL PREDICTION RULE FOR MANIPULATION: A CASE REPORT**

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**Background & Purpose:** Dry needling (DN) is an increasingly popular intervention as part of a management program for individuals with low back pain. It involves the insertion of a monofilament needle into taut bands of muscle fibers commonly identified as trigger points (TrPs) or myofascial trigger points (MTrPs). Researchers have examined DN's effectiveness in treating chronic low back pain; however, no published literature examines the use of DN for acute low back pain. The purpose of this case study is to report the outcomes of using DN as part of a management program for a patient who satisfies the validated clinical prediction rule (CPR) for spinal manipulation. **Description:** The patient was a 68-year-old male presenting to physical therapy with acute onset (<14 days) of low back pain. He developed sharp left-sided pain when returning to standing from a bent over position. Symptoms were present in the low back and upper left gluteal region with no symptoms extending distal to the knee. Pre-screening questionnaire scores yielded 6/10 pain on the Numeric Pain Rating Scale (NPRS), 12/42 and 13/24 on the Fear Avoidance Belief Questionnaire work (FABQw) and physical activity (FABQpa) sub-scales respectively, and 36% disability on the Modified Oswestry Low Back Pain Questionnaire (MODQ). Clinical examination revealed normal neurologic testing, hip passive range of motion (PROM) within normal limits, hypomobile segments of the lumbar spine, and limited lumbar active range of motion (AROM) in all planes of motion due to pain. As an alternative to manipulation due to patient preference, the patient was treated with DN to the bilateral lumbar multifidi at L3-L5 levels and provided a home management program consisting of active lumbar mobility and core stability exercises. **Outcomes:** Following three treatment sessions spaced one week apart, the patient reported 0/10 pain on the NPRS, 3% disability on the MODQ, 0/42 and 3/24 on the FABQw and FABQpa sub-scales respectively, a perceived change of 6 or 'a great deal better' on the Global Rating of Change (GROC), and pain-free lumbar AROM within normal limits. **Discussion - Conclusions:** In this patient's case, the inclusion of DN in the management program for acute low back pain relieved pain, improved perceived disability, and restored full lumbar AROM. These positive outcomes could be due to the suggested peripheral and central physiologic benefits of DN. Further research is needed to explore the potential benefits of using DN in managing acute low back pain.

**KEYWORDS:** Acute Low Back Pain, Dry Needling

POSTER #14:

ABSTRACT ID: 2769677

## **COGNITIVE FUNCTIONAL THERAPY FOR THE MANAGEMENT OF CHRONIC LBP IN A D-1 COLLEGIATE LACROSSE PLAYER: A CASE REPORT**

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**Background & Purpose:** Chronic LBP (CLBP) is common, multifactorial, and requires a biopsychosocial approach. One such approach is the Cognitive Functional Therapy (CFT), a classification system by O'Sullivan, which describes treatment including education and retraining movement patterns. Motor learning is optimized by the use of task specific practice. This is not often used by physical therapists (PTs) treating CLBP. This case report illustrates the use of CFT using a task specific approach, mindfulness and dry

needling. **Description:** A 20-year-old male, D1 lacrosse player in his junior year presented with exacerbation of CLBP. Diagnosed at the age of 13 with a pars fracture, he was taught stabilization. He had persistent pain since that disrupted sports participation: he missed eight months of lacrosse freshman & sophomore years. He experienced another exacerbation, moderate pain, and functional limitations: Oswestry Disability Index (ODI): 30%, STarT Back 4, Numeric Pain Rating Scale (NPRS) 5/10. Patient Specific Functional Score (PSFS): 4.3 - lifting (3), lacrosse (4) sitting (6). He presented with muscle guarding, excessive co-contraction of trunk muscles, including at rest, painful/ limited trunk motion all directions, lumbar hypomobility, hip flexor shortness, hypervigilance with "stabilization" strategies. He was classified into Maladaptive Movement Impairment. Intervention included education that his current bracing strategies were contributing to ongoing pain, which contradicted all previous education. Thrust and non-thrust manipulation to the thoracolumbar segments and hip stretching were include. Mindfulness training using Headspace®, dry needling to inhibit co-contraction, and task specific training were included. Return to lacrosse was broken into part-task activities and motor imagery. Lacrosse gear was incorporated early in the treatment. Full speed drills were used to be sure that co-contraction strategies did not return with increased respiratory rate. **Outcomes:** After PT interventions (twice weekly for three months), the ODI decreased to 12%, NPRS was 0/10, and PSFS was 7.6 - lifting (8), lacrosse (10), sitting (5). Global Rating of Change +7. His participation increased to 16/20 games. He played most days pain free, for the first time since 8<sup>th</sup> grade. He received intermittent treatment during the season to keep him participating fully.

**Discussion - Conclusions:** This case demonstrates successful integration of CFT including task specific training with mindfulness and dry needling to return the patient to sport.

**KEYWORDS:** Chronic Low Back Pain, classification, Cognitive Functional

Therapy

POSTER #40:

ABSTRACT ID: 2769896

**ADVERSE EVENTS ASSOCIATED WITH ORTHOPAEDIC MANUAL  
PHYSICAL THERAPY OF PERIPHERAL JOINTS: A NARRATIVE  
LITERATURE REVIEW**

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**Theory/Body: Background and Purpose:** Adverse events (AEs) after manual therapy interventions directed to the spine garner the most attention in published literature. Both the developing and seasoned clinician and/or educator should be aware of potential risk of manual therapy in other regions. The purpose is to disseminate a narrative literature review regarding occurrences of AEs attributed to manual therapy interventions commonly used in neuromusculoskeletal treatment of peripheral joint. **Methods:** A literature search was conducted through PubMed, CINAHL, PEDro, AMED, and Google Scholar using keywords “neurovascular, adverse events, manual therapy, mobilization, manipulation, dry needling, acupuncture, myofascial cupping, IASTM, massage” along with a single term for each peripheral body region (shoulder, elbow, wrist, hand, hip, knee, ankle, foot). Inclusion criteria included: written in English, any article that examined and/or reported the occurrence of AEs as defined in that study. Exclusion criteria included: literature discussing energy therapy, and surgical adverse events. **Results/Findings:** Most AEs associated with manual therapy are nominal. There is little evidence for serious AEs occurring with manual therapy interventions performed by orthopedic manual physical therapists. Serious adverse events have occurred with acupuncture near the shoulder, and massage of varying types to the shoulder and elbow/forearm region. **Clinical Relevance:** Occurrences of AEs in the peripheral joints rarely occur. Traditional manual therapy practice consists of joint mobilization, thrust manipulation, and soft tissue mobilization; however, with proliferation of other interventions such as dry needling, myofascial cupping, and instrument-assisted soft tissue mobilization, the practitioner should be aware of the potential risks of technique-driven interventions. **Conclusion:** AEs occurring with manual therapy techniques to the peripheral joints are transient and mild. The most common peripheral joint that sustains adverse events appears to be the shoulder complex followed by the foot and the elbow/forearm. It is difficult to attribute true AEs to manual therapy of peripheral joints when the orthopedic manual physical therapist uses a multi-modal treatment paradigm with potentially numerous manual therapy interventions within the same session. Since there is no internationally agreed upon definition and classification of AEs, the occurrences are likely under-reported.

KEYWORDS: Adverse events, Manual Therapy

POSTER #15:

ABSTRACT ID: 2770098

**MANUAL THERAPY COMBINED WITH VESTIBULAR EXERCISE IN TREATMENT OF A PATIENT WITH CHRONIC CERVICOGENIC DIZZINESS INDUCED AFTER A MASSAGE**

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**Background & Purpose:** Cervicogenic dizziness (CGD) has a reported prevalence of 7.5% of all dizziness and can be disabling when it becomes chronic. Literature has addressed CGD after whiplash injury, but not chronic CGD without injury. This case report describes the outcome of a patient with chronic neck pain and dizziness after an intervention consisting of manual therapy (MT) and vestibular exercises. **Description:** A 33-year-old female developed dizziness one hour after a massage (completed in prone) six years ago. Over time, this became episodic, concurrent with neck pain. She could no longer drive and avoided riding in a car as both aggravated dizziness. She previously received resistive exercises of neck and upper extremities (UE) from physical therapy (PT) and chiropractic cervical manipulation, but both further aggravated symptoms. At initial examination, all cervical active range of motions (AROMs) were performed guardedly due to pain with limited rotation bilaterally. End range cervical flexion and extension increased dizziness. The UE reflex, sensory and strength tests showed no abnormal findings. The alar ligament test revealed a soft end-feel (EF) followed by a spasm of posterior musculature on the right, but a firm EF on the left. No abnormality was found during vestibular tests, including vestibular ocular reflex (VOR) testing. Mobility testing revealed reduced mobility of occipito-atlantal, C1-2 and C2-3 segments. The Neck Disability Index (NDI) score on the initial visit was 48%. Due to lack of improvement from prior separate MT and exercises, the PT interventions included VOR and VOR cancellation exercises and MT consisting of muscle energy techniques, joint mobilization and manipulation of the upper cervical spine, even though there were no abnormal findings in vestibular tests. **Outcomes:** The patient was treated for two visits over two weeks and a follow up visit four weeks later. The patient's dizziness decreased by 50% after first visit and 65% overall improvement after two visits. She was able to ride in a car without exacerbating dizziness and then went on a two-week vacation. At follow-up, NDI score was 24% and a soft EF but no spasm was felt during the right alar ligament test. **Discussion - Conclusions:** Although the mechanism causing her dizziness remains unclear, this patient benefitted from treatment emphasizing MT and vestibular exercises. This case highlights the clinical

reasoning in successfully managing a chronic condition.

KEYWORDS: Dizziness, Manual Therapy, Visual/Vestibular Training

PLATFORM #13

ABSTRACT ID: 2770138

### **THE CONSTRUCTION OF SHAM DRY NEEDLES AND THEIR VALIDITY**

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**Background & Purpose:** Appropriate control interventions are necessary to show the treatment effect of dry needling. Different control procedures, such as dry needling the contralateral side, and sham treatments, such as the random and superficial needle insertion, have been utilized in trials. Those methods have serious downsides. A placebo needle that disappears into the handle has been developed, but has a relative high cost associated with it. A blunted needle is considered a reasonable sham treatment and has been used in the literature. One particular kind of blunted needle construction has been described, but it uses very specialized equipment, which might not be available to everybody.

**Methods:** The simple and cost-effective construction of sham needles is described: The 30 mm long handles of 50 x 100mm needles were cut with a wire cutter at the root, the burred edges were leveled with sand paper and then tested for sharpness in the PI's fingertip. The handles were inserted into the guide tubes of discarded genuine 30mm dry needles and placed into their wrappings. The wrappings were smoothed out and glued at the edges. For the validation of these sham needles 40 healthy subjects received either sham or real dry needling intervention to their right gluteal muscles. The subjects determined if the needle pierced the skin, graded the severity of pain as measured by Numeric Pain Rating Scale (NPRS), and qualified (sharp or dull) the pain associated with the intervention. **Statistical Analysis:** The Chi-squared test of association was used to find if there was a difference between the two needles in regards to piercing (yes/no) and quality of pain. The Students t-test was used to compare differences in the means of the NPRS measurements between groups. Both tests used a significance level of 0.05. **Results:** With the exception of one subject in each group, all subjects thought that the needle penetrated the skin (Chi-squared statistic  $p = 0.9$ ). The pain associated with the treatment was similar in both groups ( $p = 0.1$ ). **Discussion - Conclusions:** Low-cost sham needles can be manufactured and can be used as valid control treatment in dry needling research.

KEYWORDS: Dry Needling, Research

PLATFORM #27

ABSTRACT ID: 2770403

### **AUDIOVISUAL RESOURCES FOR THORACIC SPINAL THRUST JOINT**

## **MANIPULATION TECHNIQUES: A REVIEW OF EVIDENCE AND CURRENT RESOURCES**

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**Background & Purpose:** Clinical utility of spinal thrust joint manipulation (TJM) in physical therapy (PT) is well established. However, it is underutilized in patients who may benefit from the technique. Low utilization rate of skills in healthcare has been attributed to a “transfer training problem” where multiple barriers impede skill application after learning occurs. The transfer of spinal TJM skills, an accreditation required curricular element, to clinical use is limited by insufficient time for instruction and practice, infrequent use by clinical instructors (CI), lack of CI confidence in student performance, and lack of student confidence. These limitations may be attributed in part to inadequate supplemental review resources. Millennial learners are challenging traditional teaching methods in higher education with a preference for online video resources. Optimal videos should be of short duration, high quality, a variety of media, and by a credible source. **Methods:** Two common entry-level TJM techniques for the thoracic spine were selected for appraisal. Relevant video resources published on YouTube™ for demonstration of the techniques were searched using methods from a peer-reviewed study. For each technique, two search terms were selected based on description of the target tissue and patient position, and labels in a well-regarded text within the field of orthopedic manual PT. Search results were sorted by relevance. The first ten videos were reviewed in order to capture the videos most likely to be watched. Each video was graded for quality and content using a rubric that rated multiple domains of best practice, on a 5 point scale from unsatisfactory to outstanding, with a maximum of 45 points. **Results:** Videos averaged 34.85 points with standard deviation of 4.47. In content, ‘develops skills base’ produced the lowest average score of 3.3 and ‘health and safety’ yielded the highest average of 5.0. In the production category, ‘sound quality’ generated the lowest average of 3.2, while ‘length’ had the highest average at 4.0 points. The results of this analysis reveal the lack of current resources that meet best practice standards as demonstrated by satisfactory to good ratings. **Discussion - Conclusions:** Audiovisual resources offer a significant benefit for students and novice clinicians and may assist in solving the “transfer training problem”. Based on our review, the videos that currently exist on a widely-accessible platform do not meet evidence-based standards in terms of video quality or content.

**KEYWORDS:** thoracic spine thrust joint manipulation, Education, Evidence Based Practice.

PLATFORM #28

ABSTRACT ID: 2770773

**AUDIOVISUAL RESOURCES FOR LUMBAR SPINAL THRUST JOINT**

## **TECHNIQUES: A REVIEW OF EVIDENCE AND CURRENT RESOURCES**

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**Background & Purpose:** Clinical utility of spinal thrust joint manipulation (TJM) in physical therapy (PT) is well established. However, it is underutilized in patients who may benefit from the technique. Low utilization rate of skills in healthcare has been attributed to a “transfer training problem” where multiple barriers impede skill application after learning occurs. The transfer of spinal TJM skills, an accreditation required curricular element, to clinical use is limited by insufficient time for instruction and practice, infrequent use by clinical instructors (CI), lack of CI confidence in student performance, and lack of student confidence. These limitations may be attributed in part to inadequate supplemental review resources. Millennial learners are challenging traditional teaching methods in higher education with a preference for online video resources. Optimal videos should be of short duration, high quality, a variety of media, and by a credible source. **Methods:** Two common entry-level TJM techniques for the lumbar spine were selected for appraisal. Relevant video resources published on YouTube™ for demonstration of the techniques were searched using methods from a peer-reviewed study. For each technique, two search terms were selected based on description of the target tissue and patient position, and labels in a well-regarded text within the field of orthopedic manual PT. Search results were sorted by relevance. The first ten videos were selected in order to capture the videos most likely to be watched. Each video was graded for quality and content using a rubric that rated multiple domains of best practice, on a 5 point scale from unsatisfactory to outstanding, with a maximum of 45 points. **Results:** Videos averaged 31.79 points with standard deviation of 7.28. In the category of production, ‘sound quality’ yielded the lowest average score of 2.4 and ‘length’ the highest at 3.1. In the category of content, ‘early presentation of intent’ yielded lowest average score of 2.7 and ‘health and safety’ the highest at 4.3. The results of this analysis reveal the lack of current resources that meet best practice standards as demonstrated by poor to satisfactory ratings. **Discussion - Conclusions:** Audiovisual resources offer a significant benefit for students and novice clinicians and may assist in solving the “transfer training problem”. Based on our review, the videos that currently exist on a widely-accessible platform do not meet evidence-based standards in terms of video quality or content.

KEYWORDS: Lumbar Spine, Thrust Joint Manipulation, Education

POSTER #12:

ABSTRACT ID: 2770802

**DIFFERENTIAL DIAGNOSIS OF CHRONIC MID FOOT PAIN IN A MALE**

## **WEIGHT LIFTER: A CASE REPORT**

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**Background & Purpose:** The talo-navicular joint can be injured due to overuse or trauma and affected in patients with rheumatoid or osteoarthritis. Navicular stress fractures can also occur. The purpose of this report is to describe the clinical presentation and differential diagnosis of a patient with talonavicular pain. **Description:** A 38-year-old male presented with an insidious onset of left midfoot pain. Pain was provoked with end range dorsiflexion and plantarflexion, standing, or ambulation on uneven surfaces. The pain was a “dull ache” and 3/10 on the Numeric Pain Rating Scale (NPRS). The patient associated the worsening symptoms with increased weight lifting in preparation for a competition. Radiographs of the left foot showed degenerative changes at the talonavicular joint. On examination there was rearfoot hypomobility and inflammation at the talonavicular joint. Due to the mechanism of onset and patient's current complaints, as well as the low sensitivity of radiographs, stress fracture was not ruled out as a potential diagnosis. However, due to the patient's low levels of pain, physical therapy was started. **Outcomes:** Physical therapy included foot and ankle joint mobilization, calf stretching, and targeted stability exercises for the ankle-foot complex. Other interventions included non-steroidal anti-inflammatory medication and a shoe change. Due to a minimal decrease in pain, the patient was referred back to his orthopedic physician for further imaging studies. Magnetic radiographic imaging was notable for narrowing of the talonavicular joint with extensive osseous edema and cystic changes as well as a potential healed stress fracture of the navicular. Further screening laboratory studies including a Complete Blood Count, Erythrocyte Sedimentation Rate, C-Reactive Protein, and Rheumatoid factor were negative. Cortisone injections and surgical fusion of the talonavicular joint were discussed as treatment options. **Discussion - Conclusions:** Talonavicular joint pathology, navicular stress reaction and stress fracture should be considered in patients who present with mid foot pain exacerbated by activity. Symptoms of navicular stress fracture include midfoot pain of insidious onset that increases with activity and tenderness to palpation of the dorsal navicular prominence (N-spot). Given the limited sensitivity of standard radiographs, stress fractures should not be ruled out without further imaging studies. These patients should be monitored closely to ensure they are referred to appropriate providers if necessary.

**KEYWORDS:** Stress fracture, Navicular, Differential Diagnosis

PLATFORM # 29

ABSTRACT ID: 2770815

**INFLUENCE OF MASSAGE ON MUSCLE FATIGUE AND LOW BACK PAIN: PHYSIOLOGICAL OR CLINICAL CHANGES?**

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**Background & Purpose:** Previous studies have shown that patients with chronic low back pain (cLBP) commonly present poor back muscles endurance and strength. Individuals with cLBP usually seek care to reduce their pain symptoms but also to improve their functional capacity. A recent study suggested that up to 77% of cLBP patients will try complementary and alternative medicines such as massage therapy. However, the physiological mechanisms underlying the clinical effects of massage therapy on muscle fatigue remain unclear. The main objective was to determine if a single session of massage can reduce the short-term physiological and clinical effects of muscle fatigue in non-specific cLBP individuals. The second objective was to study the possible association between physiological and clinical changes induced by massage therapy. **Methods:** Thirty-six non-specific cLBP individuals participated in two experimental sessions (separated by 48-72 hours) during which lumbar muscle fatigue was assessed. All participants completed questionnaires to assess several psychological and clinical outcomes. In one of the sessions, the fatigue protocol (Sorenson) was preceded by a 30-minute massage of the back region. During the fatigue protocol, lumbar paraspinal muscle activity was recorded using surface electromyography whereas maximal voluntary contraction force was measured using a load cell before and following the fatigue protocol. Participants rated their perception of exertion on a visual analog scale after the fatigue protocol as well as their lumbar pain intensity before and after massage as well as after the fatigue protocol. A two-way repeated-measures ANOVA was conducted to test the effect of massage therapy on both physiological and clinical variables for both conditions. Correlation analyses were conducted to determine the linear association between physiological and clinical responses to massage therapy. **Results:** Results showed that pain perception was significantly reduced after a fatigue task when an individual received a massage ( $p=0.004$ ). Individuals with a high score of low back pain related disability showed lower back muscles endurance time ( $r = -0.35$ ). Massage therapy yielded no significant effect on fatigue-related physiological variables. **Discussion - Conclusions:** Massage therapy reduces the perception of pain after a fatigue task in non-specific cLBP individuals. Although massage yielded some positives clinical effects, they do not seem to be related to a reduction in physiological effect of muscle fatigue.

**KEYWORDS:** Chronic Low Back Pain, Manual Therapy, Electromyography

POSTER #17:

ABSTRACT ID: 2771882

**MANAGEMENT OF A NON-ATHLETE WITH A TRAUMATIC GROIN STRAIN USING MANUAL THERAPY APPROACH AND THERAPEUTIC EXERCISE: A CASE REPORT**

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**Background & Purpose:** Groin pain is often difficult to manage because approximately 30% of cases fail to receive a definitive single pathoanatomical diagnosis. Clinical examination is the primary means of determining a medical diagnosis due to poor reliability of diagnostic imaging. Disorders of the spine, pelvis, hip, and abdomen may present as hip pain, making careful examination essential. The purpose of this case report was to describe the differential diagnosis and successful management of a sedentary individual with a traumatic groin injury. **Description:** A 47-year-old sedentary male truck driver presented to physical therapy with a two-month history of right (R) medial groin pain that began with an acute strain while bowling and re-injury after a slip at work. Pushing the gas pedal of his truck, squatting, sitting for over 30 minutes, and lifting aggravated his symptoms. No pain was noted with coughing, sneezing, or Valsalva maneuver. His pain was a 3/10 at best and 8/10 at worst on the Numeric Pain Rating Scale (NPRS). He reported moderate disability (46/80) on the Lower Extremity Functional Scale (LEFS). Tenderness was noted at the adductor longus muscle belly and R pubic ramus. Active lumbar spine motion with overpressure was pain free with stiffness in all planes. Hip flexion and external strength was 4-/5. Hip flexion range of motion (ROM) was 0-86° and external rotation was 0-23°. R hip accessory motions were hypomobile and painful, particularly with lateral & medial glides. Special testing (FABER, active straight leg raise, abdominal contraction, and adductor squeeze test) provoked symptoms, suggesting athletic pubalgia. Initial treatment was hip joint mobilizations, adductor longus massage, and core strengthening. Function improved but not pain. At visit 6, a Grade III anterior-to-posterior (AP) was performed at the R pubic ramus. At visit 7 a lumbopelvic manipulation was included. **Outcomes:** The patient was seen for 12 sessions over six weeks. After 5 sessions, the LEFS improved to 67/80, but pain was 7/10 at worst. After 12 sessions the Global Rating of Change (GROC) was +7, the LEFS was 80/80, and NPRS was 0/10 at worst. His hip ROM was full and painfree, special tests were negative, and hip strength 5/5. He was able to return to full work duty and fulfill all lifting requirements for his job. **Discussion - Conclusions:** This case report demonstrated the successful management of groin pain in a sedentary individual. Further research is needed within this patient population to optimize treatment strategies.

**KEYWORDS:** Pelvis, Hip Pain, Manual Therapy

POSTER #18:

ABSTRACT ID: 2771883

**EIGHTEEN-YEAR HISTORY OF SHOULDER PAIN IN AN ELDERLY FEMALE SUCCESSFULLY MANAGED WITH ACROMIOCLAVICULAR JOINT AND FIRST RIB MOBILIZATIONS: A CASE REPORT**

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**Background & Purpose:** Shoulder pain is the second most common location of musculoskeletal pain. Elderly woman have a 25% risk of developing shoulder pain, leading to disability and reduced quality of life. The acromioclavicular joint (ACJ) is often overlooked when evaluating chronic shoulder pain. The purpose of this case report was to describe the successful management of a patient with chronic shoulder pain treated with ACJ and first rib mobilization. **Description:** A 65-year-old female presented with extensive 18-year history of right (R) shoulder pain secondary to a history of adhesive capsulitis. Failed treatment included two surgeries, glenohumeral joint (GHJ) injections, and multiple previous bouts of exercise based physical therapy. Reaching overhead and behind back were most provocative. Radiographs showed osteoarthritis of her GHJ and ACJ. Over the past year she had developed R neck pain and global R hand tingling. Pain was 7/10 at worst on the Numeric Pain Rating Scale (NPRS). Early and excessive scapular elevation was noted with all shoulder motions. Active range of motion (AROM) of R shoulder flexion was 0-160°, hand behind back was limited to T12. Shoulder flexion, abduction, and external rotation strength was 4-/5 on R. AROM of cervical spine rotation was 0-50° R and 0-60° L. Spurling's Test was negative. Passive accessory joint testing revealed hypomobility in GHJ anterior to posterior (AP) and C5-T4 central posterior to anterior (PA) movements. None of these movements reproduced her shoulder or hand symptoms. ACJ special tests were positive. ACJ was hypomobile and reproduced her shoulder symptoms.

Interventions included inferior joint mobilizations and exercise. First rib caudal glide was hypomobile and reproduced her neck and hand symptoms. These symptoms were treated with Grade III inferior oscillatory mobilizations.

**Outcomes:** The patient was seen for six sessions over eight weeks. Shoulder AROM was equal to the unaffected side. Joint mobility was normal and pain free. NPRS was 1/10 at the shoulder with heavy lifting overhead only and 0/10 neck and hand symptoms. Patient Specific Functional Scale improved for lifting overhead, washing her back, and doffing her bra from 4.67/10 to 9.67/10 at discharge. **Discussion - Conclusions:** This case demonstrated the successful use of manual therapy at the ACJ and first rib for a patient with chronic shoulder pain resulting in improved function and resolution of an 18-year history of symptoms.

**KEYWORDS:** Shoulder Pain, Rib, Manual Therapy

POSTER #45:

ABSTRACT ID: 2772320

**MANAGEMENT OF PATIENTS WITH NECK PAIN AND CERVICOGENIC HEADACHES WITH TARGETED MANUAL THERAPY AND EXERCISE INSTRUCTION. A CASE SERIES**

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**Background & Purpose:** The purpose of this case series is to describe the clinical decision making and interventions including examination findings, manual therapy provision and specific exercise instruction and outcomes for three patients who presented with neck pain and cervicogenic headaches (CGH). Clinical practice guidelines for neck pain provide support for manual therapy and exercise in the treatment of neck pain with headaches. Manual therapy interventions have shown potential in the long-term management of CGH. To date, there are few case studies, case series or clinical commentaries on this topic. **Description:** This is a retrospective case series of three consecutive patients who presented to our clinic with neck pain and CGH. Each patient's management commenced with cervical manipulation, mobilization and soft tissue mobilization of the cervical region. They then progressed to include greater components of exercise that targeted upper cervical mobility, scapular strength and stability and cervical endurance. Patient 1 (female, 53-year-old) presented with 9/10 CGH and neck pain on Numeric Pain Rating Scale (NPRS) and a Neck Disability Index (NDI) score of 50%. Patient 2 (female, 21-year-old) presented with 7/10 CGH and 7/10 neck pain (NPRS) and a NDI score of 54%. Patient 3 (female, 41-year-old) presented with intermittent CGH, 6/10 neck pain (NPRS) and a NDI score of 56%. Patient 1 received 11 sessions, patient 2 received 8 sessions and patient 3 received 6 sessions that included but not limited to: manipulation/mobilization of upper cervical vertebrae, active lengthening with over pressure of sub-occipital region and targeted exercise. **Outcomes:** Patient 1 reported having 3/10 neck pain, not having a CGH for 3 weeks and scored a 24% on the NDI at discontinuation. Patient 2 reported 0/10 neck pain or CGH for 2.5 weeks and scored a 0% on the NDI at discontinuation. Patient 3 report having 2/10 neck pain, not having a CGH for 4 weeks and scored a 10% on the NDI at discontinuation. The mean and median of outcome measures taken at discontinuation are as follows: NDI (11%, 10%), NPRS (2/10, 2/10). The mean and median numbers of therapy sessions were 8. **Discussion - Conclusions:** In this retrospective case series the treatment approach was effective in reducing neck pain, headache pain and disability due to neck pain or CGH. Further research is needed to identify whether a subgroup of patients exist in CGH. **KEYWORDS:** Cervicogenic Headache, Cervical Manipulation, Neck Pain

POSTER #2:

ABSTRACT ID: 2772800

**APPROPRIATE MANAGEMENT OF A PATIENT WITH UNDIAGNOSED MULTIPLE SCLEROSIS PRESENTING WITH KNEE PAIN: A CASE REPORT**

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**Background & Purpose:** Multiple sclerosis is a disease of the nervous system that affects the brain and spinal cord. By damaging myelin sheaths, neurological signals are slowed throughout the body, creating a myriad of dysfunctions including: muscle weakness, visual disturbances, coordination/balance deficits, numbness and tingling, and cognitive impairments. The purpose of this presentation is to highlight a clinical case of a patient with knee pain presenting to an outpatient orthopedic clinic with an undiagnosed neurological disease, which was found to be multiple sclerosis. **Description:** A 33-year-old female presented to the physical therapy clinic with a 10-month history of right knee pain/instability, which began following a car accident. Patient stated that her knee "bent backward." Magnetic resonance imaging (MRI) revealed a medial meniscus tear and lateral partial-thickness cartilage loss of the lateral patellar facet. During evaluation, knee pain was moderate, 5/10 on the Numeric Pain Rating Scale. The primary complaint related to having to hold onto walls due to balance deficits. **Outcomes:** Several obvious gait deviations, poor squat form, and inability to perform single limb balance on right leg without immediate loss of balance were observed. Strength in the legs rated were globally weak (2+/5 bilaterally). Special testing revealed a positive pivot shift, straight leg raise, and slump on right leg, indicating knee instability and adverse neural tension. Due to poor balance and gait deviations, reflexes were performed, which revealed a hyperactive patellar reflex bilaterally, while Achilles reflexes were normal. Babinski sign and clonus was also present bilaterally. The patient's physician was contacted based on above findings with recommendation to have imaging of the head and cervical spine performed. MRI revealed: "Multiple foci of T2 hyperintensity in bilateral cerebral and cerebellar white matter, corpus callosum, basal ganglia, & brainstem. Focal T2 hyperintensity in left side of the cervical spinal cord at C5. These changes are consistent with multiple sclerosis. None of the lesions enhance, to suggest acute or active demyelination." **Discussion - Conclusions:** Referral back to a physician for further diagnostic workup may be warranted if a patient presentation does not line up with findings normally seen in a traditional case of orthopedic knee pain. With the proper testing and clinical reasoning, physical therapists are well qualified to advocate for the greater good of their patients.

**KEYWORDS:** Differential Diagnosis, Imaging, Physical Therapy

POSTER #24:

ABSTRACT ID: 2773377

**CLINICAL MANAGEMENT OF HAMSTRING PAIN IN A PROFESSIONAL BALLET DANCER WITH MULTI- REGIONAL DYSFUNCTION: A CASE REPORT**

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**Background & Purpose:** The psoas muscle has biomechanical and neurophysiological interconnections with the thorocolumbar, lumbosacral, sacroiliac, and hip joints. Ballet dancers rely on the psoas muscle to function properly with these joints to successfully perform dance mechanic, otherwise injury can result. The purpose of this case report is to describe the clinical management, targeting the psoas, of professional ballet dancer with hamstring pain. **Description:** A 33-year-old professional female ballet dancer came to physical therapy with complaints of right proximal hamstring pain and chronic right psoas tightness. It was hypothesized that there was multi-joint dysfunction related to the psoas muscle tension, which caused repetitive overuse of the hamstring. In addition to exercise, manual therapy treatment based on findings consisted of (1) Trigger point release to the psoas, (2) Contract/relax mobilization of the thorocolumbar junction into right rotation, (3) Manipulation to the posterior border of the greater trochanter to correct the femoral head alignment, (4) Manipulation correction for a posteriorly rotated ilium, and (5) Muscle energy technique to reset the sacrum. **Outcomes:** This dancer was seen for six treatment visits. Her hamstring pain decreased from a 5/10 to a 0/10 on the Numeric Pain Rating Scale. Her hamstring strength improved from 4-/5 to 4+/5, she had minimal right psoas trigger points, and she was able to resume back to full performance level. **Discussion - Conclusions:** In applying manual therapy to biomechanically/neurophysiologically correct the joints based on clinical findings, this case demonstrated the successful return to dancing while minimizing hamstring overuse. Physical therapists should assess and treat all joints a muscle crosses in order to maximize recovery and prevent re-injury. Further research in this area is warranted.

KEYWORDS: Performing Arts, Hamstring , Sacroiliac Joint

POSTER #4

ABSTRACT ID: 2773429

**THE EFFECTS OF SPINAL MOBILIZATIONS, MANUAL STRETCHING, AND EXERCISES IN THE TREATMENT OF TESTICULAR PAIN: A CASE REPORT**

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**Background & Purpose:** Testicular pain/orchialgia is an uncommon problem with an association of low back pain. Common causes of orchialgia are infection, trauma, or idiopathic. Referred pain can result from midureteral stones, indirect inguinal hernia, or nerve entrapment. Surgical treatments are well published but there is a paucity on physical therapy (PT) treatment. The purpose of this case report was to describe the PT management in relieving orchialgia. **Description:** The patient was a 43-year-old former Marine and currently working as a law enforcement agent. He had a seven-year history of back pain with radiating symptoms to the testicles and anterior thigh. The patient had an ongoing intermittent pain that lasted up to 2 weeks and resulted in functional deficits of running, bowling without extreme pain, sleeping, and sexual activities. Microdenervation to relieve the symptoms two years ago was unsuccessful. During examination, no pelvic asymmetry was observed. However, psoas palpation reproduced patient's symptoms. Posteroanterior (PA) to the spinous process from T12 to L3 was painful and hypomobile. A combination of spinal PA mobilizations of Grade III and IV on the spinous process from T12 to L3, deep stripping of the psoas muscle followed by psoas stretching, and spinal stability exercises was provided to address patient's impairments. **Outcomes:** After six treatment sessions over three weeks, the patient self-discharged secondary to no pain during running and bowling. His pain on Numeric Pain Rating Scale reduced from 5-10/10 to 0/10. Patient's outcome measures were received at the end of six weeks by mail. The patient's Oswestry Disability Index improved from 58% to 0%. His Lower Extremity Functional Scale scores improved from 40/80 to 80/80. At four-month follow-up over the phone, the patient had no symptoms during sleeping, running, and bowling. **Discussion - Conclusions:** This patient had successful outcomes because the orchialgia symptoms may be due to genitofemoral nerve entrapment at the psoas muscle. The genitofemoral nerve penetrates through the psoas muscle and then divides into a genital and a femoral component. The genital component of the nerve supplies to the scrotum whereas, the femoral component supplies to the anterior and lateral aspect of the thigh. The entrapment at the psoas muscle can cause pain in the testes and to the anterior and lateral aspect of the thigh. The combination of spinal mobilization and manual psoas stretching might have helped relieve the entrapment resolving patient's symptoms.

**KEYWORDS:** Chronic Back Pain, Anterior hip pain, Manual Therapy

POSTER #52:

ABSTRACT ID: 2773541

**INTERVENTIONS FOR CERVICOGENIC PAIN IN CONCUSSION  
MANAGEMENT USING EVIDENCE- BASED CLINICAL EXAM: A CASE  
REPORT**

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**Background & Purpose:** Physical therapy (PT) management of concussions is a growing area of specialization; however, intervention guidelines and outcomes have been inconsistent. This can result in prolonged therapy and recovery. This is a case report of a patient presenting cervical pain and headaches after sustaining two concussions within four weeks. He had received medication from his physician, but had not been referred to PT until he was unable to return to work. **Description:** This patient is a 34-year-old male who presented to PT with complaints of daily headaches and neck pain onset after two concussions within four weeks. The initial evaluation was performed three months after a second concussion. He attempted to return to work and experienced exacerbations of his headaches, panic attacks, lightheadedness, and insomnia. This patient presented with a headache rated 5/10 on the Numeric Pain Rating Scale (NPRS). His function was limited as noted by a Neck Disability Index of (NDI). 36% He had decreased left cervical rotation, segmental hypomobility, and poor deep neck flexor endurance. He underwent a cervical examination, Vestibular/Ocular Motor Screen (VOMS) and Buffalo Treadmill testing in an effort to classify the source of his post-concussion syndrome (PCS). The VOMS was unremarkable; however, cervicogenic testing produced symptoms with segmental hypomobility in C2-3 downglide testing. The graded Buffalo Treadmill test increased his baseline headache of 4/10 to 7/10 at level ten of the test. These findings indicated both a cervicogenic and physiologic post-concussion syndrome. PT intervention consisted of 14 total treatments over six weeks. The first the treatments consisted manual therapy to the cervical spine including high velocity thrust techniques at C2 and cervical proprioception exercises. **Outcomes:** On his fourth visit, he reported 0/10 headache and 2/10 neck pain on the NPRS. He now had a NDI of 28%. He was subsequently instructed on a graded cardiovascular program to address the remaining physiological symptoms. He returned to work symptom free in six weeks. **Discussion - Conclusions:** This case demonstrated the successful management of patient status post two concussion with orthopaedic manual PT and a subsequent cardiovascular program to facilitate return to work. Combining validated concussion assessment tools and manual assessment, a directed treatment resolved cervicogenic pain and headaches. Further research within this subpopulation is warranted.

**KEYWORDS:** Thrust Manipulation, Concussion, Headaches

PLATFORM #2

ABSTRACT ID: 2773600

**EFFECTIVENESS OF ELECTRICAL DRY NEEDLING, MANUAL THERAPY AND EXERCISE IN PATIENTS WITH KNEE OSTEOARTHRITIS: A MULTI-CENTER RANDOMIZED CLINICAL TRIAL**

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**Background & Purpose:** Manual therapy, exercise and acupuncture have been found to be moderately effective for knee osteoarthritis (OA). However, no previous study has investigated the combination of the effectiveness of electrical dry needling in addition to manual therapy and exercise for patients with knee OA. Thus, the purpose of this study was to compare the effects of electrical dry needling, manual therapy and exercise to manual therapy and exercise in individuals with knee OA. **Methods:** Two hundred forty-two participants (n=242) with knee OA were randomized to receive electrical dry needling, manual therapy and exercise (n=121) or manual therapy and exercise (n=121). The primary outcome was knee pain intensity as measured by the Numeric Pain Rating Scale (NPRS). Secondary outcomes were pain intensity (WOMAC Pain Subscale), function (WOMAC Physical Function Subscale), related-disability (WOMAC Total Score), medication intake, and the Global Rating of Change (GROC). The treatment period was six weeks with follow-up at 2 weeks, 6 weeks, and 3 months. The primary aim was examined with a 2-way mixed-model ANOVA with treatment group as the between-subjects variable and time as the within-subjects variable. **Results:** The 2X4 ANOVA revealed that patients with knee OA receiving the combination of electrical dry needling, manual therapy and exercise experienced significantly greater improvements in knee pain intensity (F=29.094; P<0.001), WOMAC Pain Subscale (F=30.13; P<0.001), WOMAC Physical Function Subscale (F=30.114; P<0.001) and WOMAC Total Disability Score (F=35.504; P<0.001) than those who received manual therapy and exercise at 6 weeks and 3 months. Patients receiving electrical dry needling were 1.7 times more likely to have completely stopped taking medication for their pain at 3 months than individuals receiving manual therapy and exercise (OR: 1.6; 95%CI: 1.24-2.01; P=0.001). Based on the cutoff score of +5 or higher on the GROC, significantly (P<0.001) more patients (n= 91, 75%) within the electrical dry needling group achieved a successful outcome compared to the manual therapy and exercise group (n=22, 18%) at 3 months follow-up. Effect sizes were large (SMD>1.1) for all outcome measures in favor of the electrical dry needling group at 3 months. **Discussion - Conclusions:** The inclusion of electrical dry needling into a manual therapy and exercise program was more effective for improving pain and function than application of manual therapy and exercise alone in individuals with knee OA at mid-term (3 months).

KEYWORDS: Knee osteoarthritis, Dry Needling, Manual Therapy

PLATFORM #17

ABSTRACT ID: 2773627

**EFFECTIVENESS OF ELECTRICAL DRY NEEDLING, MANUAL THERAPY, EXERCISE AND ULTRASOUND IN PATIENTS WITH PLANTAR HEEL PAIN:**

## A MULTI-CENTER RANDOMIZED CLINICAL TRIAL

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**Background & Purpose:** The isolated applications of electrical dry needling, manual therapy, exercise, and ultrasound have been found to be effective for plantar heel pain. However, no previous study has investigated the combined effect of these interventions; therefore, the purpose of this study was to compare the effects of electrical dry needling, manual therapy, exercise and ultrasound to manual therapy, exercise and ultrasound in individuals with plantar heel pain. **Methods:** One hundred and eleven participants (n=111) with plantar heel pain were randomized to receive electrical dry needling, manual therapy, exercise and ultrasound (n=58) or manual therapy, exercise and ultrasound (n=53). The primary outcome was first-step pain in the morning as measured by the Numeric Pain Rating Scale (NPRS). Secondary outcomes included resting foot pain (NPRS), pain during activity (NPRS), the Lower Extremity Functional Scale (LEFS), the Foot Functional Index (FFI), medication intake, and the Global Rating of Change (GROC). The treatment period was 4 weeks with follow-up at 1 week, 4 weeks, and 3 months. The primary aim was examined with a 2-way mixed-model ANOVA. **Results:** The 2X4 ANOVA revealed that individuals with plantar heel pain who received the combination of electrical dry needling, manual therapy, exercise and ultrasound experienced significantly greater improvements in first-step morning pain (F=22.021; P<0.001), resting foot pain (F=23.931; P<0.001), pain during activity (F=7.629; P=0.007), LEFS (F=13.081; P<0.001), FFI Pain (F=13.547; P<0.001), FFI Disability (F=8.746; P=0.004) and FFI Total (F=10.65; P<0.001) than those who received manual therapy, exercise and ultrasound at 3 months. Patients in the electrical dry needling group were 1.2 times more likely than patients receiving manual therapy, exercise and ultrasound to have completely stopped taking medication for their pain at 3 months (OR: 1.22; 95%CI: 1.02-1.51; P=0.045). Based on the cutoff score of +5 or higher on the GROC, significantly (P<0.001) more patients in the electrical dry needling group (n=45, 78%) achieved a successful outcome compared to manual therapy, exercise and ultrasound group (n=11, 21%). Effect sizes were large (SMD>0.9) for all outcome measures in favor of the electrical dry needling group. **Discussion - Conclusions:** The inclusion of electrical dry needling into a multimodal manual therapy, exercise and ultrasound protocol was effective for improving pain and related-disability in patients with plantar heel pain at mid-term follow-up (3 months).

**KEYWORDS:** Plantar Fasciitis, Dry Needling, Manual Therapy

POSTER #49:

ABSTRACT ID: 2773729

**REGIONAL INTERDEPENDENCE AND IMPAIRMENT-BASED  
CONSIDERATIONS IN THE TREATMENT OF PLANTAR HEEL PAIN: A CASE  
STUDY REPORT**

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**Background & Purpose:** Numerous anatomic structures and biomechanical faults may contribute to plantar heel pain (PHP), making diagnosis and treatment challenging. Moreover, symptoms lasting greater than seven months predict a poor outcome. Current literature has failed to show convincing evidence for treatments directed at proximal factors or neurologic contributions to PHP. The purpose of this abstract is to describe the diagnosis and treatment of PHP using an impairment-driven, regional interdependence approach. **Description:** A 45-year-old, obese (Body Mass Index = 41) female with bilateral (B) PHP for seven months reported moderate pain, (4/10 on the Numeric Pain Rating scale (NPRS) at rest) and limited function (Foot and Ankle Ability Measure (FAAM) 76%). The patient could neither walk one mile nor stand for greater than one hour, both requirements of her occupation as a teacher. Ankle dorsiflexion (DF) was measured at 0-8° and 0-2° on the left (L) and right (R), respectively. The windlass test was positive for pain provocation on the R and biomechanical effect bilaterally. The patient was weak in ankle plantar flexion (PF), inversion, intrinsic toe flexion, lumbopelvic flexion, extension and hip external rotation. A straight leg test was positive for reproduction of the B foot pain. Low back pain was elicited with lumbar extension and with posterior to anterior pressure at the L5 segment. Palpation at the medial calcaneal tubercle elicited pain B. Initial treatment included FDN to the lumbar region and calf musculature, deep tissue massage to the calf and plantar tissues, joint mobilization of the ankle and foot articulations, and sciatic nerve sliders. Home exercises included strengthening of the ankle DFS, invertors, intrinsic toe flexors, lumbopelvic flexors, extensors and hip external rotators. Stretching of the ankle PFS, toe flexors and neural sliders were also prescribed. At the 7<sup>th</sup> visit, the patient's symptoms had largely resolved. FDN was performed at the quadratus plantae and abductor hallucis which immediately resolved the patient's remaining foot pain. **Outcomes:** At six weeks, the patient had resumed her teaching responsibilities. She had 0/10 (NPRS) and scored 95% on the FAAM. Strength, pain free ROM, windlass test and neural provocation testing were all within functional limits. **Discussion - Conclusions:** Given that PHP can be recalcitrant to conservative care and that numerous factors may contribute to this condition, an impairment-driven, regional interdependence approach should be considered.

**KEYWORDS:** Heel pain, Regional Interdependence, Dry Needling

POSTER #50:

ABSTRACT ID: 2773765

**EMERGENT REFERRAL OF A STREPTOCOCCUS INFECTION PRESENTING WITH THORACIC STRAIN: A CASE REPORT**

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**Background & Purpose:** In a direct access setting, identification and referral of serious conditions has grown in importance. Streptococcus infections can present with symptoms that mimic musculoskeletal symptoms. Given that the mortality rate can be as high as 25%, identification of patients with this condition is paramount. **Description:** The patient was a 17-year-old male who presented five days following symptom onset with a diagnosis of a thoracic strain and streptococcus infection. Pain, located in the posterior cervicothoracic region, was reported as worsening (9-10/10 on the Numeric Pain Rating Scale). The patient reported flu like symptoms, headache, fever, fatigue, and pain with coughing. He denied bowel or bladder symptoms, paresthesias, chest pain or dyspnea. Pain was aggravated by spinal movement in any direction and movement of the left upper extremity. He was exquisitely tender to light touch in the cervicothoracic region. Myotomal testing was attempted but abandoned secondary to extreme pain. Deep tendon reflexes were hyper-reflexive in the lower extremities and absent in upper extremities, suggesting neurologic involvement. Modified slump testing—avoiding movement of the affected areas--was performed with upper cervical flexion and knee extension. This was positive for reproduction of the patient's symptoms further suggesting neurogenic rather than musculoskeletal origin of pain. Given the history of infection, abnormal neurologic tests and worsening pain and constitutional symptoms, the patient was immediately referred to his physician. **Outcomes:** Following referral and physician evaluation, the patient was sent to the hospital emergency room and subsequently transported to a major metropolitan hospital. He was diagnosed with a streptococcus infection, treated surgically and with intravenous antibiotics and discharged five days later with an excellent prognosis. **Discussion - Conclusions:** Despite obvious signs and symptoms that necessitated immediate referral, several lessons can be gleaned from this case report. Abnormal neurologic signs further argued pain of a musculoskeletal origin. Kernig's sign, a restricted, painful passive extension of the knee while the hip is flexed, is suggestive of meningitis and may explain the positive slump sign. Symptoms of worsening streptococcus infection, including headache, fever, fatigue, pain and stiffness and the presence of a prior diagnosis clearly warranted immediate referral in the absence of other findings.

**KEYWORDS:** Referral, Infection, Direct Access

POSTER #29

ABSTRACT ID: 2774295

**A 20-YEAR HISTORY OF CHRONIC LOW BACK PAIN TREATED WITH ANTERIOR TO POSTERIOR LUMBAR MOBILIZATION: A CASE REPORT**

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**Background & Purpose:** Chronic low back pain (LBP) prevalence is on the rise globally resulting in a 65% increase in health-care costs between 1997 and 2005. Few studies have examined the effects of lumbar anterior-to-posterior (AP) mobilization to treat chronic LBP, particularly in those with stenotic presentation. The purpose of this case report was to describe effects of L5 AP joint mobilization in a patient experiencing chronic LBP. **Description:** A 40-year-old male presented with 20-year history of chronic LBP. Initial injury occurred in high school while performing a football tackle. Most recently, symptoms increased after initiating a jogging program for weight loss. Cortisone injections at the lumbar spine failed to decrease symptoms. Radiographs were negative but showed deficits in lumbar lordosis curve reversal. MRI was not performed. Cessation of running decreased pain but patient's goal was to run to aid weight loss and care for his children with minimal symptoms. Active range of motion (AROM) revealed a lack of lumbar lordotic curve reversal with flexion, relief of symptoms with flexion, and pain with lumbar extension at 25°. Passive accessory motion assessment revealed hypermobility at L5 with posterior-to-anterior (PA) pressure, pain with PA's at L4/5 and relief of symptoms with L5 AP. Straight leg raise testing was negative bilaterally. L5 AP mobilization was performed for one minute, three times over four sessions with core strengthening exercises. At visits 5-7 the dosage was increased to six times for one minute, with progression of core strengthening. Progress was measured via Modified Oswestry, Global Rating of Change (GROC), lumbar extension AROM, and running tolerance. **Outcomes:** He was able to progress from 0 to 10 minutes of running with pain no greater than 3/10 on the Numeric Pain Rating Scale. The Modified Oswestry improved from 16% to 6% disability. GROC score improved to a 6+ at discharge. Patient demonstrated improved pain free lumbar extension by 10°. **Discussion - Conclusions:** Lumbar AP mobilization was effective in treating this patient's chronic low back pain. While strengthening exercises may have contributed to his overall improvement, it is unlikely that this effect was due to strength gains, since the course of care occurred over 7 visits. The effectiveness of lumbar AP mobilization in this subpopulation requires further research. **KEYWORDS:** Chronic Low Back Pain, Lumbar Spine

POSTER #31:

ABSTRACT ID: 2774994

**ROTARY ELBOW MOBILIZATION TO REDUCE VALGUS CARRYING ANGLE DEFORMITY IN A 6-YEAR-OLD POST SUPRACONDYLAR FRACTURE REPAIR: A CASE REPORT**

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**Background & Purpose:** Supracondylar humeral fractures (SCHF), the most common elbow fractures in children, represent 3% of all pediatric fractures. Cubitus varus and valgus deformities are common, with cubitus varus reported in 50-85.7% of cases and cubitus valgus reported in 5-21%. Though often considered cosmetic, evidence links these deformities to elbow dysfunction two-three decades later. Current practice for carrying angle deformity is surgery. The benefit of physical therapy (PT) in managing post-op SCHF repairs in children has been questioned; however, elbow joint mobilization has not been used in previous studies. The purpose of this case report was to describe a successful change in valgus carrying angle with the use of a rotary elbow joint mobilization post-SCHF repair. **Description:** A 6-year-old female fell off of her bed and sustained a left (L) Type 3 SCHF. A SCHF repair with percutaneous pinning was performed the following day with a typical post-operative protocol. The patient presented with elbow range of motion (ROM) limitations and a valgus carrying angle deformity (L-24°, R-8°). She reported mild lateral elbow pain (2/10 on the Numeric Pain Rating Scale [NPRS]) when first extending her elbow. Assessment of combined elbow extension and adduction brought on her pain. Over 12 visits, the patient received a combination of orthopedic manual PT and exercise. Manual interventions included combined humeroulnar extension & adduction and elbow flexion with longitudinal distraction joint mobilizations (grade III+ due to pain and IV+ after three visits). Exercise interventions were designed to encourage use of left upper extremity, improve shoulder and elbow strength, and facilitate use of her elbow in the new carrying angle range gained after manual interventions. **Outcomes:** Carrying angle improved (L 0-10°). She reported 0/10 NPRS in daily activities and higher-level activities (baseball & dance) at discharge. These were maintained one-month post treatment. Upon discharge, the patient's father completed two outcome measures: Global Rating of Change was +6. The Activities Scale for Kids improved from 59% (moderate disability) to 88% (mild disability). **Discussion - Conclusions:** Carrying angle changes are multi-planar. The rotary joint mobilization and exercises in the new range may have contributed to the maintenance of carrying angle gains by lengthening the lateral elbow structures in both the frontal and sagittal planes. Further research is warranted.

KEYWORDS: Elbow, Joint Mobilization, Fracture

PLATFORM #30:

ABSTRACT ID: 2775038

**INTRARATER RELIABILITY OF PROVOCATION TESTS OF THE SACROILIAC JOINT**

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**Background & Purpose:** Provocation testing of the sacroiliac joint (SI) is often included in examination of individuals with back pain. These tests, however, can be performed using different methods including a sidelying compression test and a supine squish test. Considering the forces may vary between these tests and consistent force production may be needed to enhance accuracy of serial testing, it is important to clarify force reliability and to investigate the magnitude of forces. The purpose of this study was to 1) determine the intratester reliability of supine and sidelying SI provocation tests; and 2) to compare forces used during supine and sidelying SI provocation tests. **Methods:** Thirty-one healthy adults participated. An SI provocation test was performed in two positions: sidelying and supine. While lying on one side, the examiner placed a hand held dynamometer over the opposite lateral aspect of the ilium. Using both hands, the examiner completed a sidelying SI provocation test. The process was repeated three times and the maximal force used was recorded. In the same position, the examiner also exerted a maximal force against a solid object to determine the examiner's maximal force. The subject was then instructed to lie in the supine position. The examiner placed one hand held dynamometer over the lateral aspect of the right ilium and a second dynamometer over the left ilium. Using both hands, the examiner completed a supine SI provocation test. Maximal force was recorded for each of the three repetitions of the supine SI test. In the same position, the examiner also exerted a maximal force against a solid object to determine the examiner's maximal force. **Results:** Intratester reliability of force for the three repetitions of each of the SI tests ranged from 0.900 - 0.907. Mean force during the sidelying SI provocation test was 246.4N, which represented 88.3% of the examiner's maximal force during a sidelying SI test. Mean force during the supine SI test was 268.7N which represented 79.8% of the examiner's maximal force during a supine SI test. **Discussion - Conclusions:** While intratester reliability of sidelying and supine tests were clinically good, forces used during each test were significantly different. The rationale for using varying forces, the impact of the examiner's perceived exertion and differences between examiners warrant further investigation.

KEYWORDS: Sacroiliac Joint, Reliability, Examination

PLATFORM #11

ABSTRACT ID: 2775067

**PALMAR AND DORSAL MOBILIZATIONS OF THE MCP JOINT:  
ASSESSMENT OF MOVEMENT AND ASSOCIATION WITH SYSTEMIC  
HYPERMOBILITY**

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**Background & Purpose:** Joint mobilization (JM) of the metacarpophalangeal (MCP) joint can be utilized to treat individuals with finger impairments. Research is lacking that quantifies the amount of intraarticular movement that occurs during JM of the MCP, values that may be of assistance in determining appropriate interventions. In addition, the association of the amount of intraarticular movement with common systemic mobility scales is not known. As the presence of hypermobility often influences the decision to utilize JM, clarifying this relationship may assist with treatment planning. The purpose of this study was to 1) measure the movement that occurred during palmar and dorsal JM; and 2) examine the relationship between movement and systemic hypermobility scores. **Methods:** Thirty-eight healthy subjects participated. Beighton Scale scores were recorded. An ultrasound (US) transducer was placed over the dorsal MCP joint. Using the US, the position of the proximal phalanx was recorded at rest and as a single examiner applied a grade 1, a grade 2 and a grade 3 sustained palmar mobilization as defined by Kaltenborn. Mobilizations were repeated three times. The US transducer was then moved to the palmar surface of the MCP and testing repeated in the dorsal direction. ANOVAs were completed to determine the relationship between movement, grade and Beighton score. **Results:** Mean palmar movement for grades 1, 2 and 3 were 0.90 mm, 1.20 mm and 1.52 mm, respectively. All values were significantly different. Mean dorsal movement for grades 1, 2 and 3 were 2.21 mm, 3.85 mm and 4.55 mm, respectively. All values were significantly different. Beighton hypermobility scores were not significantly associated with palmar or dorsal movement. **Discussion - Conclusions:** Results of this research support the ability of a single clinician to differentiate three different grades of dorsal and palmar glides during a single treatment session. Results do not support the use of the Beighton hypermobility scale as an indicator of the amount of joint play in the MCP suggesting that the use of the Beighton hypermobility scale in determining the appropriateness of JM of the MCP may be limited.

KEYWORDS: Mobilization, Reliability, Hypermobility

POSTER #53:

ABSTRACT ID: 2775257

**RESOLUTION OF CHRONIC PERIPARTUM LOWER EXTREMITY PAIN WITH LUMBAR SPINE MANUAL THERAPY: A CASE REPORT**

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**Background & Purpose:** Low back pain (LBP) and pelvic girdle pain (PGP), the most common of pregnancy-related pain conditions, occur in 20-90% and 20-50% of females, respectively. Both lumbar and pelvic structures can be sources

of referred pain into the lower extremities (LEs); however, prevalence of referred LE pain from these structures during/after pregnancy is unknown. Due to potential overlap in areas of referred pain, differentiation of pain-generating structures (lumbar vs pelvic girdle/sacroiliac joint [SIJ]) is advocated by current guidelines to appropriately direct treatment. The purpose of this case report was to describe the differential diagnosis and resolution of LE pain in a female with chronic peripartum LE pain. **Description:** A 20-year-old reported a two-year history of worsening of right LE pain that began during the last month of pregnancy. She reported constant, 10/10 pain on the Numeric Pain Rating Scale (NPRS) at its worst, diffuse, and non-dermatomal pain from the iliac crest to her foot with aggravating activities (moving from sitting to standing, getting out of bed). Lumbar active range of motion (AROM) was full and pain free. Laslett's cluster of SIJ provocation tests was negative. Active straight leg raise (ASLR) and neurological exam were negative. Accessory joint exam revealed L1-S2 hypomobility with posterior-to-anterior (PA), but no symptoms were reported. However, endrange lumbar oscillatory PA (Grade III+) at L3 did provoke symptoms when she attempted to stand after examination. Joint mobilizations and self-mobilizations resulted in resolution of LE pain in subsequent visits. The Patient Specific Functional Scale (PSFS) was 4.3 (getting out of bed, moving sit-to-stand, stairs). **Outcomes:** The patient was treated for three follow-up visits. At last visit, she reported 0/10 LE pain (NPRS) with only intermittent R LBP. Global Rating of Change Scale score was +4 (moderately better). Her PSFS improved to 2.3. **Discussion - Conclusions:** Pregnancy-related pain often persists postpartum, and multiple structures in the low back and pelvic girdle must be considered as pain generators. Current guidelines recommend segmental mobility testing to assess both pain response and mobility. This case report described treatment based on findings of hypomobility with resulting symptom resolution. Despite studies demonstrating poor reliability of determining segmental mobility, this case report highlights the potential benefits of this assessment to help guide treatment in chronic peripartum pain. **KEYWORDS:** Pregnancy, Clinical Reasoning, Joint Mobilization

POSTER #39:

ABSTRACT ID: 2775377

**UTILIZATION OF THORACIC EXAMINATION AND TREATMENT TECHNIQUES IN AN INDIVIDUAL WITH CHRONIC LOW BACK PAIN: A CASE REPORT.**

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**Background & Purpose:** Multiple classification systems are available to guide clinical interventions for patients with low back pain (LBP). Less defined are options for individuals who do not exhibit the signs or symptoms for inclusion in

these classifications yet report constant LBP. The purpose of this case study is to describe the physical therapy (PT) management of an individual with a chief complaint of chronic LBP who did not fit into any classification system.

**Description:** A 34-year-old female presented with a nine-year history of left sided LBP that began approximately six months following the birth of her second child. Medical imaging including ultrasound, CT scan, and multiple gynecological evaluations were negative. The patient reported multiple gynecological procedures without relief of pain. The patient had no history of PT or chiropractic care, but had been on medication for nine years to control pain. Physical examination revealed no significant lumbar mobility deficits. No reproduction of pain occurred with lumbar or sacroiliac testing. The patient did present with moderate thoracic range of motion deficits and rib mobility deficits, but no reproduction of pain with thoracic segmental mobility testing. Symptoms were reproduced with resisted breathing. Treatment was initiated that included: anterior/inferior rib mobilizations, posture correction and breathing education. Also incorporated were rib mobility, taping for rib positioning and exercises directed at abdominal and oblique control with functional activities. As pain decreased, interventions emphasized breathing mechanics and rib position during squatting, jumping, and running. **Outcomes:** Following the treatment course, the patient reported no pain at rest. Pain at its worst had decreased from 10/10 on the Numeric Pain Rating Scale at initial evaluation to 4/10 at discharge. Intermittent pain occurred infrequently, which was self-corrected using self-mobilization and muscle activation. At discharge, the patient's Focus on Therapeutic Outcomes (FOTO) score increased from 53/100 to 76/100. The patient was able to return to running, lifting, and playing with children without increased pain. **Discussion - Conclusions:** This case report reinforces the need to consider the thoracic spine and, more specifically, rib mobility as a source of chronic LBP. For this patient whose symptoms were not provoked with lumbar testing, treatment of thoracic and rib impairments resulted in a reduction of lumbar pain and an increase in function. Further research is warranted

KEYWORDS: Chronic Back Pain

POSTER #10:

ABSTRACT ID: 2775534

**MANUAL THERAPY AND ACTIVITY MODIFICATIONS FOR MANAGEMENT OF BILATERAL LATERAL EPICONDYLOPAHTY: A CASE REPORT IN A DIRECT ACCESS SETTING**

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**Background & Purpose:** Direct access physical therapy (PT) outcomes for lateral epicondylopathy (LE) have not been extensively reported. Cervical spine pain has been identified as a strong predictor for persistent LE symptoms, and LE is a common diagnosis seen in PT. With this, there is a growing body of

research to provide support for manual therapy targeted at the cervical spine for management of patients with LE. Therefore, the purpose of this case report is to describe PT management for a patient with bilateral LE using manual therapy targeted at the cervical spine and elbow, along with activity modification interventions. **Description:** A 43-year-old male presented to direct access PT for chronic bilateral elbow pain exacerbated with activity and an associated history of cervical pain with limited mobility. Key physical examination finding included: 1) painful resisted wrist extension; 2) painful passive wrist flexion; 3) limited humeral-ulnar joint mobility; 4) painful and limited cervical active range of motion; 5) limited gross cervical and thoracic spine joint mobility; and 6) was negative for radiculopathy testing. Initial clinical impression suggested bilateral LE with associated mid-cervical spine joint restrictions. Interventions consisted of manual therapy targeting the elbow and cervicothoracic spine supplemented with activity modification and patient education to avoid symptom provoking activities. **Outcomes:** Following six treatment sessions, clinically important improvements were seen with: pain intensity during activity (9/10 to 0/10 on the Numeric Pain Rating Scale [NPRS]), QuickDASH (42.5 to 4.5), Patient Specific Functional Scale [PSFS] (4/10 to 8/10), and Global Rating of Change (“a very great deal better”). Global improvements in cervical active range of motion (ranging from 10 to 24 degrees) and pain-free wrist extension were also observed. At a 15-week follow-up, the patient demonstrated 0/10 NPRS overall, 0 QuickDASH, and 10/10 PSFS, with maintained cervical range of motion. **Discussion - Conclusions:** Findings from this case report emphasize potential benefits of receiving manual therapy and activity modification interventions for bilateral LE through direct access PT. Important to note, bilateral LE is not common; therefore clinicians should consider the regional interdependence between the cervical spine and the elbow when examining and intervening with manual therapy techniques. Future studies are required to evaluate this treatment approach in a larger sample of patients. **KEYWORDS:** case report, Lateral Epicondylitis, Direct Access

PLATFORM #18

ABSTRACT ID: 2775621

**THE USE OF MANUAL THERAPY AND JOINT POSITION TRAINING IN AN INDIVIDUAL PRESENTING WITH LOW BACK PAIN AND A LATERAL SHIFT: A CASE REPORT**

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**Background & Purpose:** An observable lateral shift is a clinical occurrence in some individuals with low back pain (LBP). This change in trunk orientation may result in altered joint position sense and motor control. Joint position sense error has been displayed in subjects with neck pain. Individuals with low back pain

have been found to have increased trunk repositioning error and altered postural control. The case study details the use of manual therapy and joint position exercises to manage an individual presenting with low back and leg pain with a lateral shift. **Description:** A 28-year-old male presented with a six-week history of left sided LBP after falling in the shower. He reported left sided lumbar, posterolateral hip and proximal thigh pain. A right lateral shift was observed and the patient felt “off center” when ambulating. His pain was a 4/10 on the Numeric Pain Rating Score (NPRS) and 46% on the Oswestry Disability Index (ODI). His symptoms increased to an 8/10 and extended distally to the left knee in lumbar extension and left lateral flexion. Both ranges of motion were limited to approximately 50% and L4 and L5 were found to be hypomobile with central posterior-to-anterior (PA) testing. Single leg stance was limited on the left (<10 seconds). PA joint mobilization was performed in prone at the lower lumbar spine with the trunk positioned in right lateral flexion. The patient's trunk was repositioned to midline as symptoms decreased. A manipulation targeting L5 was performed bilaterally. His pain was 1/10 on the NPRS at the 5<sup>th</sup> visit but his right lateral shift and complaints of instability persisted. Trunk repositioning and control exercises were initiated with and without a laser and target to facilitate proprioception and motor learning. Exercises were performed in variety of positions and balance demands were progressively increased. **Outcomes:** Therapy was discontinued after 8 visits. The patient reported 0/10 LBP on the NPRS and 4% on the ODI. The patient had full ROM of the lumbar spine and denied balance or gait impairments. **Discussion - Conclusions:** A patient with LBP and leg pain with a right lateral shift was managed successfully with a combination of manual therapy and joint proprioceptive exercises involving the use of laser feedback. Joint position training with the use of a laser may be a strategy in managing individuals with lateral trunk deviations. Further research into the use of proprioceptive training in individuals with lateral shift deviations is warranted.

KEYWORDS: Lumbar Spine, Proprioception, Joint Manipulation

POSTER #42:

ABSTRACT ID: 2775632

**UTILIZATION OF A MOVEMENT SYSTEM GUIDED TREATMENT IN A PATIENT WITH ANTERIOR KNEE PAIN: A CASE STUDY**

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**Background & Purpose:** Current evidence demonstrates a lack of correlation between certain patho-anatomical findings and imaging and symptom presentations. The purpose of this study is to describe the use of movement driven manual treatment for a patient with anterior knee pain with positive magnetic resonance imaging (MRI) findings. **Description:** A 62-year-old female

reported a chief complaint of right anterior-medial knee pain. An MRI obtained one week prior to physical therapy (PT) evaluation demonstrated medial meniscus tear and incomplete nondisplaced stress fracture of the medial tibial plateau. Functional limitations included inability to walk one mile and participate in Parkinson's group class. Findings included symptom reproduction with right lower extremity weight bearing and right passive knee extension with manual overpressure. Her patella demonstrated slight reduction in superior glide. She ambulated with slightly flexed knee and initial forefoot contact bilaterally. No symptoms were reproduced with hip/knee active range of motion (AROM), ligamentous, meniscus, or special testing. The comparable sign used was passive knee extension with overpressure and ambulation. Mulligan concepts of joint glides were used for treatment. Manual knee extension overpressure with tibial external rotation and superior patellar glide at evaluation reduced right knee pain with walking from 8/10 to 5/10 on the Numeric Pain Rating Scale (NPRS) within session. **Outcomes:** After first manual treatment, NPRS improved; therefore symptom driven manual treatment was utilized for the next four sessions vs. protocol or time based treatment. The patient was instructed in a home program to promote and maintain overpressure into terminal knee extension in non-weight bearing and eventually weight bearing. After four sessions, the NPRS was 0/10, with full return to functional activities including walking. After six sessions, ambulation improved with a Six Minute Walk Test within age appropriate distance. She returned to full participation in her Parkinson's group class. She reported a +7 on the Global Rating of Change. Focus on Therapeutic Outcomes score improved from 45/100 to 83/100. **Discussion - Conclusions:** This case supports the use of movement driven manual therapy treatment versus pathoanatomical driven treatment, especially after a rapid response to treatment. Further research in this area is warranted.

KEYWORDS: Manual Physical Therapy, Anterior Knee Pain, Movement System

PLATFORM #38

ABSTRACT ID: 2775670

**IDENTIFICATION AND TREATMENT OF LATERAL FEMORAL CUTANEOUS NERVE ENTRAPMENT IN A 36-YEAR-OLD FEMALE PRESENTING WITH PERSISTENT ANTEROLATERAL HIP PAIN, ONE YEAR POST ACETABULAR LABRAL REPAIR: A CASE REPORT**

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**Background & Purpose:** Hip labral pathology has been reported to have a prevalence ranging from 22% in the asymptomatic population to 55% in the symptomatic adult with arthroscopic reconstruction the preferred surgical

technique. Complications are reported at 1.3-1.6% with hip arthroscopy, the lateral femoral cutaneous nerve (LFCN) has been implicated due to portal site location. The case report describes the examination and initial treatment for nerve entrapment in a patient presenting with persistent anterolateral hip pain one year after arthroscopic hip surgery. **Description:** A 36-year-old female presented with right anterolateral hip symptoms for six months. She had undergone bilateral acetabular labral reconstructions with her right hip surgery 18 months prior. Immediately after her right hip surgery, she had reported numbness along her lateral thigh, which had initially recovered after her right surgery. She had successfully returning to running; however, her symptoms insidiously started six months prior. She had unsuccessfully trialed joint mobilizations, strengthening and dry needling. Her past medical history was significant for ankylosis spondylitis, which was being successfully managed with Enebrelel. Initial function as measured by the Lower Extremity Functional Scale (LEFS) was 57/80. Numeric Pain Rating Scale (NPRS) was 2/10 at rest and 6/10 with squatting and active and passive hip external rotation. The patient was determined to have LFCN entrapment due to comparable symptom reproduction with palpation of the ilioinguinal ligament, passive hip flexion and external rotation. Further, she noted decrease in symptoms with tissue approximation. Management commenced with tape application for tissue approximation and nerve gliding targeting the LFCN with immediate changes in pain at rest and decreased pain with single and double leg squatting. **Outcomes:** At her two-week follow up, her LEFS improved to 67/80. NPRS at rest was 0/10. She only had inguinal symptoms with deep squatting. She additionally had received a lidocaine injection at the LFCN in between her physical therapy sessions post initial improvement. **Discussion - Conclusions:** This case report identifies the necessity to assess for peripheral nerves including cutaneous nerves as possible pain generators post hip labral interventions. Additionally this report demonstrates the use of a comparable sign and response to treatment to assist in the examination in a patient with persistent symptoms.

KEYWORDS: Nerve entrapment, Arthroscopy, Hip Pain

PLATFORM #9

ABSTRACT ID: 2775764

**CHANGES IN GAIT CHARACTERISTICS AS A RESULT OF A PROGRAM OF MANUAL THERAPY AND EXERCISE FOR INDIVIDUALS WITH HIP OSTEOARTHRITIS**

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**Background & Purpose:** Osteoarthritis (OA) of the hip can lead to pain, limited motion, and a reduction in functional ability. One conservative management

option for hip OA is physical therapy (PT) where manual therapy and exercise can help alleviate symptoms and improve quality of life in particular the ability to walk. The purpose of this study was to use instrumented gait analysis to quantify any changes that occurred as a result of an individualized PT program for individuals diagnosed with hip OA. **Methods:** Nine participants, 7 females and 2 males, mean age 63 years old ( $\pm$  12 SD) completed instrumented gait analysis prior to and within 1 week of completing 4 weeks of an individualized PT program of manual therapy and exercise. The manual therapy consisted of nonthrust and thrust manipulation with the exercises then prescribed to increase flexibility and strength. Temporospacial, kinematic and kinetic data were collected using a 10-camera Vicon<sup>TM</sup> motion analysis system and Amti<sup>TM</sup> force plates. Of particular interest in this study was the assessment of changes in walking speed, step and stride length, stance time, and hip extension. All data were assessed for normality and then either paired t-tests or the Wilcoxon Signed Rank test were used. An alpha level of 0.05 was used and analysis was completed using SPSS, version 20. Effect sizes were also calculated for all variables. **Results:** The mean walking speed at baseline was 1.03m/s and following the 4 weeks of PT was 1.20m/s. However this change was not statistically significant ( $p=0.051$ ), but a large effect size (0.77) was found. Changes in stance duration, hip extension, and step and stride length were not statistically significant, with negligible to small effect sizes noted for stance duration and step and stride changes. A medium (0.42) effect size was found for the change in maximum hip extension. The ratio of stance time of the involved to the uninvolved limb was 1.06 prior to the PT intervention and was 1.02 following the intervention. **Discussion - Conclusions:** There was an increase walking speed, step length, stride length, and hip extension accompanied by a reduced stance following an individualized program of manual therapy and exercise, but these changes were not statistically significant. However, the large effect size for the change in walking speed is considered to be clinically significant. Improvements in the ratio of stance time of the involved to uninvolved limb also showed promise for the ability of an individualized PT program to increase symmetry of gait.

KEYWORDS: MANUAL, Kinematics, Outcome

PLATFORM #31

**CONTROL ID: 2776279 TITLE: PHYSICAL THERAPISTS' USE OF MANUAL THERAPY DIRECTED AT THE HIP(S) FOR INDIVIDUALS WITH A PRIMARY COMPLAINT OF LOW BACK PAIN**

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**Background & Purpose:** The purpose of this study was to determine the

frequency that physical therapists use manual therapy (MT) techniques directed at one or both hips with patients presenting with a primary complaint of low back pain (LBP). Recent evidence suggests that a combination of thrust and non-thrust hip joint MT plus exercise may be beneficial for individuals with LBP. **Methods:** An electronic survey was emailed during January - April 2017 to members of the Orthopaedic and Sports Sections of the American Physical Therapy Association and members of the American Academy of Orthopaedic Manual Physical Therapists. The survey underwent expert content review and pilot testing prior to distribution. The survey aimed to determine common clinical practice patterns with this population. Eight questions asked directly about MT usage directed at the hips. Data are reported descriptively as means  $\pm$  SD and proportions. **Results:** The response rate was estimated to be 15% based on projected opening and click rates of the emailed survey. Respondents (n=930, age 40.5 $\pm$ 11.4, 48% male, 14.6 $\pm$ 11.6 years of experience) mainly work in private practice/hospital outpatient (85%, n=794) and provide 33.2 $\pm$ 12.5 hours/week of direct patient care of which 40.7% $\pm$ 18.4 of their caseload is with patients with LBP. Approximately 64% (n=596) of respondents have a DPT degree, 50% obtained the OCS designation (n=451) and 13% were graduates or currently enrolled in an orthopaedic manual physical therapy program (n=124). 93% (n=866) of respondents report that they 'most of the time or always' examine the hip(s) in individuals with LBP. Hip soft tissue mobilization (STM) was used more frequently (70%) than thrust/non-thrust joint techniques (63%) for individuals with LBP. The most frequently used hip STM techniques were trigger point release (31.1%), myofascial release (20.4%), massage (19%), instrumented (12.9%) and dry needling (7.1%). Respondents reported most frequently target the piriformis (61.8%), followed by iliopsoas (50.9%), and gluteus medius muscles (50.5%), respectively. The most frequently used joint-related techniques were: non-thrust/single plane (35%), non-thrust/combined plane (25%), mobilization with movement (20.4%), and thrust/single plane (10.5%). **Discussion - Conclusions:** These findings suggest that physical therapists routinely use MT techniques targeting the hip joints in participants with a primary complaint of LBP. Soft tissue mobilization techniques are reportedly used at a higher frequency than that of joint mobilization techniques.

KEYWORDS: Low Back Pain, Hip, Survey

PLATFORM #25

ABSTRACT ID: 2776466

**IS SYMPATHOINHIBITION POSSIBLE IN MANUAL THERAPY OF THE NECK? RESULTS OF A RANDOMIZED, PLACEBO-CONTROLLED TRIAL IN PAIN-FREE ADULTS**

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**Background & Purpose:** Some normotensive patients can have a spike in resting systolic blood pressure (SBP) in response to acute neck pain. Applying the typical dosage of mobilization may potentially result in a sympatho-excitatory response, further increasing resting SBP, which may be detrimental in some patients. Therefore, there is a need to explore other dosage regimens that could result in a decrease in SBP. **Purpose:** To compare the blood pressure (BP) and heart rate (HR) response of pain-free, normotensive adults when receiving unilateral posterior-to-anterior mobilization (PA) applied to the neck versus its corresponding placebo (PA- P). **Methods:** 44 (18 females) healthy, pain-free participants (mean age,  $23.8 \pm 3.04$  years) were randomly allocated to 1 of 2 groups. Group 1 received a PA-P in which light touch was applied to the right 6th cervical vertebra. Group 2 received a PA to the same location. BP and HR were measured prior to, during, and after the application of PA or PA-P. A mixed-effect model of repeated measure analysis was used for statistical analysis.

**Results:** During-intervention, the PA group had a significant reduction in SBP, while the placebo group had an increase in SBP. The change in SBP during-intervention was significantly different between the PA and the placebo group ( $p$ -value . 0.003). There were no significant between-group differences found for HR and diastolic BP (DBP). The overall group-by-time interaction was statistically significant for SBP ( $p$  value= 0.01). **Discussion - Conclusions:** The main finding of this study is that JM performed with a distinctive dose compared to placebo, led to an immediate transient reduction in SBP, implying a sympatho-inhibitory effect. Thus, this disparate result contrasts with the prevailing theory that JM produces sympatho-excitatory effect. Though we did not directly compare dosage in this study, we postulate that the dissimilar dosing employed in our study (relative to the dosage in numerous previous studies) may largely explicate the divergent results. When compared to placebo, the dosage of applied PA resulted in a small, short-lived drop in SBP not exceeding the minimal detectable change. Trial registered at Germanctr.de (DRKS00005095)

**KEYWORDS:** Neck pain, Manual Therapy, Sympathetic

POSTER #11:

ABSTRACT ID: 2776585

**ATYPICAL CASE OF A HEALED AVULSION FRACTURE IN AN ADOLESCENT ATHELETE: A CASE REPORT**

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**Background & Purpose:** Avulsion fractures of the lesser trochanter are a relatively uncommon location for high-level adolescent athletes. There is current

little research describing the presentation and rehabilitation process to return an athlete with this condition back to sports. This case report describes the presentation and manual therapy intervention of an undiagnosed healed avulsion fracture of the lesser trochanter in a premier high school athlete and Division I (D1) football prospect. **Description:** A 16-year-old high school athlete, involved in varsity football and baseball, presented to physical therapy (PT) after having multiple reoccurrences of anterior hip pain primarily during sprinting and changing directions. After a year of intermittent symptoms, the patient began baseball training in February. He again noticed left sharp anterior groin pain (5/10 on the Numeric Pain Rating Scale [NPRS]). After seeing his primary care provider, he was referred to PT with the diagnosis of left groin strain. Recent radiographs, however, revealed the patient had a healed avulsion fracture of the lesser trochanter. This patient's comparable sign was supine active straight leg raise (SLR). He presented with positive Thomas test, palpable active trigger points through the iliopsoas and gait deviations including hip ER during swing and stance phase. He received six treatments of PT over five weeks which included iliopsoas trigger point release and soft tissue mobilization, iliopsoas directed stretching and graded exposure to range of motion and strengthening, eventually progressing to dynamic exercises and sprinting. **Outcomes:** Following six sessions of therapy, the patient improved active SLR from 0 degrees with pain to 73 degrees without pain. NPRS improved from 5/10 to 0/10. FOTO score improved from 58/100 to 98/100. He returned to baseball season with full participation without symptoms. **Discussion - Conclusions:** This case report describes the presentation and intervention for a healed avulsion fracture of the lesser trochanter, a relatively uncommon diagnosis. This patient presented with a shortened iliopsoas treated by addressing trigger points and normalizing function to restore full mobility of the muscle in order to avoid future re-injury. Further research is warranted to identify effective PT in healed avulsion fractures.

**KEYWORDS:** Graded Exposure, Hip Flexors, Trigger Point

PLATFORM #6

ABSTRACT ID: 2776648 **FIRST RIB MOBILIZATION WITH MOVEMENT TO IMPROVE CERVICAL ROTATION IN A PATIENT WITH A MULTIPLE LEVEL CERVICAL FUSION: A CASE REPORT**

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**Background & Purpose:** The frequency of spinal fusion procedures has risen significantly over the past few decades. Following a multi-level cervical fusion, patients have significantly less range of motion (ROM), with rotation reduced approximately 14%, depending on level(s) fused. It is possible that muscle tension and poor posture may contribute to forward displacement of the first rib,

thus impacting cervical ROM. The purpose of the study is to demonstrate the effectiveness of a first rib mobilization technique and its impact on cervical rotation ROM and stiffness following a four-level fusion. **Description:** The patient was a 65-year-old male two weeks post C3-7 fusion and laminectomy. He demonstrated poor posture, limited cervical ROM, limited mobility of first rib bilaterally, and reported stiffness with cervical rotation. Active cervical rotation was 0-55° to the right and 0-45° to the left. Using cervical rotation as a comparable sign, first rib mobilizations were performed to attempt to impact cervical ROM and reduce stiffness. After addressing posture, the mobilization technique posteriorly rotated the first rib while the patient actively rotated to the ipsilateral side within pain-free available range. The technique was performed bilaterally prior to reassessment of active cervical rotation. **Outcomes:** The patient reported reduction in pain/stiffness and demonstrated increased ROM after the first rib mobilization, within each session. The improvements were maintained between sessions. This technique was utilized in the follow-up treatment sessions, after which the patient had functional cervical rotation, 0-66° to the left and 0-62° to the right, without symptoms. The patient returned to work and driving his motorcycle without limitations and Numeric Pain Rating decreased from 5/10 to 0/10. The Neck Disability Index improved from 44% to 0% disability. At one month follow-up after discharge the patient continued to report no pain or stiffness with cervical rotation, and had maintained cervical ROM improvements and function. **Discussion - Conclusions:** After a multiple-level cervical fusion, the patient's ROM may be limited. Many patients also have poor posture, potentially contributing to the altered position of the first rib. This case supports the use of a first rib posterior rotation mobilization in patients following cervical fusion as a method to gain functional cervical rotation, decrease pain and reduce stiffness.

**KEYWORDS:** Cervical Spine, Cervicothoracic Manual Therapy, Mobilization with Movement

POSTER # 32:

ABSTRACT ID: 2776665

**MANUAL THERAPY DIRECTED AT THE CERVICAL SPINE FOR A PATIENT WITH COMPLAINTS OF FOREARM PAIN AND A DIAGNOSED ROTATOR CUFF TEAR: A CASE REPORT**

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**Background & Purpose:** There is evidence for treatment aimed at the cervical spine in patients who have distal complaints. The purpose of this case report is to describe the outcome of treating the cervical spine in a patient with forearm complaints and mild shoulder pain referred to therapy for an MRI-confirmed

rotator cuff tear (RCT). **Description:** A 63-year-old female was referred to therapy for an “incomplete RCT of the right shoulder.” However, her main complaint was a “pulling sensation” in the anterior forearm. She also reported right mid-scapular pain, and a “stiff neck.” Active range of motion (ROM) of the cervical spine was negative. Neck and scapula pain were reproduced with right posterior-to-anterior (PA) glide at C5-6. Right shoulder abduction ROM was limited and painful. The median upper limb neural provocation test (ULNPT) reproduced forearm symptoms on the right side. Drop arm and empty can test were negative, but reproduced shoulder pain. Initial treatment focused on cervical spine, including grade III-IV PA mobilizations and supine physiologic rotation, both at C5-6. Median nerve glides were given for home. Next session she had improved ULNPT ROM and decreased forearm symptoms. Treatment focus then shifted from the cervical spine to remaining shoulder impairments. **Outcomes:** The median ULNPT and shoulder abduction were used as a comparable signs. At full external rotation, she initially lacked 40° of elbow extension and shoulder abduction was 0-98°. She was seen for eight visits over over weeks. After cervical treatment, ROM and pain improved. ULTT was symmetrical, with symptoms at end range elbow extension. Active shoulder abduction to 0-141°. Pain decreased from 8.0 to 2.0 on the Visual Analog Scale. Function improved from 52% to 78% on the Upper Extremity Care Connections. She returned to gardening, her main goal, with minimal symptoms at discharge. **Discussion - Conclusions:** This case demonstrates the importance of differentiation of the cervical spine in providing appropriate treatment to a patient referred for a RCT, complaining of forearm symptoms. Symptoms were produced locally in the neck, traveling to the scapula, but improved with cervical treatment. Due of this, manual treatment was first directed at the cervical spine, alleviating most of her complaints. Further research is warranted to examine this potential subpopulation.

KEYWORDS: Cervical, Rotator Cuff Tear, Cervical Spine versus Shoulder

POSTER #37:

ABSTRACT ID: 2776714

**THE ADDITION OF PAIN NEUROSCIENCE EDUCATION TO MANUAL THERAPY ON TEMPOROMANDIBULAR JOINT DYSFUNCTION: A CASE REPORT**

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**Background & Purpose:** There is growing evidence that Pain Neuroscience Education (PNE) provided to patients with chronic musculoskeletal pain can result in decreased pain and improved physical performance. Most of this evidence has been related to the spine and peripheral joints. There is limited research regarding PNE and temporomandibular joint dysfunction (TMD). The

purpose of this case study is to detail the effects of the addition of PNE to manual therapy in a woman with chronic bilateral jaw pain. **Description:** A 36-year-old female presented to clinic with long history of bilateral jaw pain, described as a cramping sensation. Symptoms were aggravated by talking, laughing, chewing hard food, and stress. She also reported regular headaches. Objective evaluation demonstrated limited mandibular opening and limited lateral deviation bilaterally. Increased tone was present bilaterally in the masseters, temporalis, and lateral pterygoid area. No popping and/or clicking found upon auscultation with stethoscope. She demonstrated rounded shoulders and forward head posture. Signs/symptoms were considered primarily related to muscular tension. Treatment consisted primarily of soft tissue mobilization to bilateral masseters, temporalis, lateral pterygoid area, sternocleidomastoid, and suboccipitals, as well as time spent emphasizing PNE. Upon initiating PNE the third session, the patient began to experience days without pain for the first time. She was also placed on a home program addressing aerobic exercise and sleep hygiene, which are both closely tied to the integration of PNE. **Outcomes:** The patient received physical therapy for ten sessions over 13 weeks. Mandibular opening and pain ratings were used as primary outcomes throughout plan of care. Mandibular opening improved from 30 mm to 45 mm with therapy. At initial evaluation, pain was rated 6/10 at its best and 10/10. She was discharged with no TMD pain. TMD Disability Index improved from 27.5% at evaluation to 17.5% at discharge. **Discussion - Conclusions:** There is currently limited research regarding the use of PNE on temporomandibular disorders. This case discusses the benefit of incorporating PNE when treating patients with chronic TMD and pain. The patient had the greatest change when PNE was combined with manual therapy.

KEYWORDS: Temporomandibular Dysfunction, Temporomandibular Joint, Therapeutic Neuroscience Education

PLATFORM #45

ABSTRACT ID: 2776744

**PAIN MECHANISM BELIEFS: A COMPARISON OF SAMPLES ACROSS DIFFERENT POINTS IN PHYSICAL THERAPY TRAINING**

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**Background & Purpose:** Entry-level physical therapy curriculums require a shift in focus from a pathoanatomical framework to one considering both biomedical (BMed) and biopsychosocial (BPsy) mechanism to be consistent with recommended practice models. Prior to implementing curricular changes, pain mechanism beliefs (PMB) should be compared across different time points in entry level and post professional education. The first aim was to evaluate if age

or prior chronic pain experience was associated with PMB in first year Doctor of Physical Therapy students (1YR SPTs). The second aim was to compare PMB of 1YR SPTs to previously published data of third year physical therapy students (3YR SPTs) and fellowship and/or residency-trained physical therapists (PTs). **Methods:** PMB were collected from 1YR SPTs using the validated Health Care Provider's Pain and Impairment Relationship Scale (HC-PAIRS) to assess PMB on a BMed to BPsy continuum, with higher scores indicating greater BMed beliefs. Relationships between age and HC-PAIRS scores were analyzed using Pearson's correlation coefficients. Independent t- tests were used to determine differences in HC-PAIRS scores between students who experienced a chronic pain condition and those who did not. PMB across the different training time points were analyzed by comparing population mean scores on the HC-PAIRS and their standard deviations. **Results:** Response rate to baseline survey was 42/70 (60.0%). Statistically significant relationships across HC-PAIRS scores, age, and prior chronic pain experience were not identified. However, comparison of collected beliefs data with existing data did reveal potential for differences between groups. 1YR SPTs (mean=51.95) scored lower on HC- PAIRS ( $p<0.01$ ) than 3YR SPTs (mean=61.2). PTs with post-professional training (mean = 39.0) scored lower on HC-PAIRS ( $p<0.01$ ) than 1YR and 3YR SPTs. **Discussion - Conclusions:** Age and prior chronic pain experience, were not associated with PMB (as indicated by HC- PAIRS scores) in 1YR SPTs. 1YR SPTs did, however, demonstrate a lower score on HC-PAIRS as compared to a sample of 3YR SPTs suggesting that progression through an entry-level program may enhance BMed PMB. Interestingly, both 1YR SPTs and 3 YR SPTs demonstrated more BMed oriented PMB than a sample of PTs with post professional training. Considering these findings, it is suggestive that entry-level training may initially enhance SPTs beliefs toward a greater BMed mechanism for pain experience, while specialty training may enhance greater BPsy beliefs.

KEYWORDS: Education, Pain Education, Pain

PLATFORM #37;

ABSTRACT ID: 2776812

### **ACCESSING THE LEVATOR SCAPULAE: THICKNESS DIFFERENCES WITH AND WITHOUT A BOLSTER**

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**Background & Purpose:** Therapists often treat muscular dysfunction in the shoulder. Thus, they benefit from knowing how positioning the shoulder affects its muscles. The levator scapulae elevates the scapula and pulls inferiorly on the cervical vertebrae. This leads to problems like upper crossed syndrome. It is also affected by shoulder positioning. This study examined levator scapulae thickness with and without a shoulder bolster. The results can lead to more effective treatment of the levator scapulae by dry needling, positional release, and soft

tissue mobilization. It was hypothesized that using a bolster increases muscle thickness of the levator scapulae. **Methods:** A convenience sample of 60 individuals participated with a mean age of 26 years. Data were collected with a LogiQ e ultrasound machine. Bony landmarks (spine of the scapula, T1, and T2 spinous processes) were marked to ensure measurement consistency. The sound head was positioned longitudinally, parallel to the vertebral column, superior to the scapular spine. The prone subject was instructed to relax and breathe normally while video and images of the levator scapulae were taken. This was done twice in each condition (no bolster and bolster). The bolster was a towel rolled up to 7-9 cm in diameter in order to raise the shoulder to the level of the vertebral spinous processes. Levator scapulae muscle thickness was measured on the images using internal software. Two measurements for each muscle were averaged. **Results:** Data were analyzed using JMP software. Dominant versus non-dominant muscle thickness was compared with no differences in either condition (no bolster and bolster;  $p=0.14$  and  $0.26$  respectively). The data were collapsed into only 'no bolster' and 'bolster' categories and a paired t-test was performed. Mean thickness of 0.88 cm was found in the 'no bolster' condition compared to 1.22 cm for the 'bolster' condition. A significant difference of 0.34 cm was found ( $p < .0001$ ; CI 0.26 cm - 0.42 cm). **Discussion - Conclusions:** The thickness of the levator scapulae was significantly altered between conditions. With a bolster, the muscle was an average of 0.34 cm thicker than without, supporting the hypothesis that a bolster increases thickness in this muscle. This is likely due to the proximity of the insertion points. The proximity will shorten the sarcomeres and put the muscle in a thicker, relaxed position which will help clinicians access the levator scapulae for therapeutic purposes such as dry needling, positional release, and soft tissue mobilization.

KEYWORDS: Ultrasound Imaging, Anatomy

PLATFORM #5

ABSTRACT ID: 2776860

### **GAINING TERMINAL KNEE EXTENSION WITH A MOBILIZATION WITH MOVEMENT FOR A PATIENT WITH KNEE OSTEOARTHRITIS: A CASE REPORT**

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**Background & Purpose:** Patients with knee pain often have difficulty obtaining active and passive terminal extension. Tibiofemoral mobilizations can be used to assist in gaining limited range of motion. Mulligan describes addressing

positional faults with mobilizations of the tibiofemoral joint, as well as adding movement (mobilizations with movement [MWM]) in peripheral joints to gain pain-free range of motion. The purpose of this case report is to document the use of an external rotational glide of the tibia with MWM for a patient with knee osteoarthritis. **Description:** A 65-year-old female was referred to physical therapy with complaints of recurrent left knee pain and “snapping” over the past five years. She demonstrated left knee flexor weakness and lacked eight degrees of left knee extension actively and passively. She reported difficulties with walking, kneeling, stairs, standing, and squatting due to her symptoms. Initially treatment included posterior mobilizations of the femur on the tibia and tibiofemoral distraction followed by quad strengthening exercises. The patient gained two degrees of left knee extension over several treatment sessions that did not carry over from session to session with these interventions. External rotation glides of the tibia on the femur were performed with movement and patient gained and maintained six degrees of knee extension over four treatments. The glides were performed in a non-weight bearing position. Quadriceps strengthening exercises were given to the patient for her home program. **Outcomes:** The patient was discharged with full active and passive knee extension range of motion after ten sessions over a four-week time frame. Her self-reported function on Care Connections lower extremity questionnaire improved from 66% to 92%. Her symptoms on the Visual Analogue Scale decreased from 1.3 to 0 cm. She had no clicking, popping, or snapping at her left knee with all functional activities at discharge. **Discussion - Conclusions:** Mulligan concepts and associated treatments are often applied to peripheral joints to gain pain-free range of motion. This case report demonstrates the success of using a tibial rotational technique (MWM) to gain terminal knee extension, with an increase in function and decreased complaints of pain. Further research is needed to explore this as an effective treatment approach.

KEYWORDS: Knee osteoarthritis, Mobilization with Movement

POSTER #21:

ABSTRACT ID: 2776880

MODIFICATION OF A LOWER LIMB NEURAL PROVOCATION TEST IN A PATIENT WITH ABOVE KNEE AMPUTATION AND LUMBAR RADICULOPATHY: A CASE REPORT

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**Background & Purpose:** Lower limb neural provocation testing is commonly used to determine neural sensitivity and help differentiate between common lumbar diagnoses including lumbar radiculopathy. The purpose of this case report is to demonstrate the ability to modify lower limb tension neural provocation testing via more proximal sensitizers with a patient with an above knee amputation. **Description:** A 38-year-old female referred to physical

therapy with complaints of low back pain and radiating right posterior thigh pain. Aggravating activities included moving from sitting to standing and standing lumbar extension. Past medical history was significant for a right above knee amputation when she was five-years-old. Straight leg raise (SLR) was negative for reproduction of symptoms bilaterally. Seated slump test (SST) was performed. Due to the lack of knee or ankle joints for sensitization, right hip flexion was used initially without reproduction of her symptoms. SST was modified by increasing thoracic and cervical flexion to end range, which reproduced her back and right posterior thigh pain. Thoracic flexion was maintained during cervical extension, which relieved her symptoms, indicating a positive neural provocation test. After a trial of neural tensioners in the modified SST position using cervical flexion/extension, the patient was able to transfer sit-to-stand without pain. Initial treatment consisted of modified SST position neural mobilization and repeated motions into lumbar flexion. In subsequent visits, treatment was directed at the lumbar spine to treat the neural interface. **Outcomes:** The patient's symptoms improved with the modified SST; however, symptoms did not fully resolve. With addition of manual therapy directed at the neural interface, the patient's comparable signs of sit-to-stand and standing lumbar extension did not reproduce any lumbar or radicular symptoms. After four visits over four weeks, Modified Oswestry score improved from 40% to 0%. Numeric Pain Rating Scale improved from 9/10 to 0/10. The patient was able to return to her prior level of function. **Discussion - Conclusions:** This case study demonstrates the importance of using clinical decision making for differentiation when traditional special tests are not applicable to patient. Utilization of a modified slump tensioner with proximal sensitizers for differentiation and treatment led to better identification of involved structures and a more focused manual intervention for quicker patient recovery. **KEYWORDS:** Lumbar spine, Differential Diagnosis, Lumbar Radiculopathy

PLATFORM #7

ABSTRACT ID: 2776967

**THE EFFECT OF SEGMENTALLY DIRECTED MANUAL CERVICAL DISTRACTION ON PAIN AND GRIP STRENGTH IN CERVICAL RADICULOPATHY: A CASE REPORT**

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**Background & Purpose:** Cervical radiculopathy (CR) defined as radicular patterned pain in upper extremities (UE) related to cervical spine (CS) nerve root compression and/or irritation, also has symptoms (Sx) of sensory, motor and reflex changes, UE muscle weakness and rapid atrophy. Grip strength (GS) is a reliable and valid outcome measure with a minimally clinically important

difference (MCID) of 14.3 lbs. Manual therapy (MT) is recommended to decrease pain and disability caused by CR. The purpose of this case report is to demonstrate the substantial improvement in GS during and following a segmentally directed manual cervical distraction maneuver, (SDMCD), a variation of axial traction per Maitland. The SDMCD is created by stabilizing the inferior segment then flexing & laterally flexing the CS 30° away from UE Sx and applying axial distraction. Kinematic MRI and cadaver foraminal volume studies of the CS with flexion and distraction show increased foraminal space. To date, no description of a similar MT technique's immediate effect on a patient with CR and GS was found. **Description:** A 63-year-old male with 2-month history of neck pain and left UE radiating Sx of dysesthesias and weakness, worsened with sitting, CS rotation active range of motion (AROM) greater than 45° and UE loading. CS rotation AROM was less than 60°, altered light touch C6/C7 dermatome, positive upper limb neural provocation testing (ULPT) (median/ulnar), Spurling & Distraction tests were consistent with Clinical Practice Guidelines' neck pain with radiating pain. Four-point verbal categorical pain rating scale (VRS) and GS (lbs) were recorded pre-MT, during a 30- second SDMCD bout and post treatment (Tx) for 9 sessions over 3 months. **Outcomes:** First visit VRS was severe. GS pre-Tx was 33 lbs, during SDMC was 54 lbs (increase of 40%), and post- Tx was 50 lbs (increased 35%). Similar improvement percentages were seen during other sessions when VRS was severe. On visits with moderate rated VRS, improvements between pre-Tx and SDMCD were 13% and post-Tx were 18%. By visit 7, VRS rated mild and GS pre-Tx was 58 lbs, SDMCD was 75 lbs, and post-Tx was 70 lbs. At discharge, VRS wa mild, the GS left/right differential was less than MCID with sensation. ULNPT was intact and symmetrical. AROM and tolerance to loading was normalized. **Discussion - Conclusions:** This case suggests that improvement in CS pain and GS can occur during treatment and immediately following SDMCD in a patient with CR. Further investigation of the phenomenon is warranted.

KEYWORDS: Manual Physical Therapy, Cervical Radiculopathy, Outcome Measures

PLATFORM #47

CONTROL ID: 2777021

OMPT FELLOWSHIP GRADUATES: PERCEIVED IMPACT ON PROFESSIONAL AND PERSONAL LIVES

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**Background & Purpose:** To describe the impact of fellowship training (FT) on graduates professionally and personally. **Methods:** Open-ended responses provided in an online survey of graduates from a credentialed, hybrid learning, multi-site OMPT fellowship program were analyzed. Open-ended questions asked graduates how FT impacted them professionally and personally, as well as barriers to training. Graduates reported life situations and responsibilities that they balanced alongside FT. Responses were analyzed using an inductive approach without predefined categories from the raw narrative data. Frequency data are reported for life responsibilities. **Results:** 75 (97%) of 77 graduates completed the survey and 67 provided open ended question responses. Nine themes emerged from the analysis; Expertise, Clinical Reasoning, Evidence Based Practice, Teaching, Communication, Traits/Values, Professionalism, Collaboration, and Difficulties. Metacognition and clinical skills were identified as characteristics of expertise. Graduates identified FT as having a positive impact on clinical reasoning including critical thinking and decision-making. Confidence with teaching was enhanced. For professionalism and collaboration, graduates indicated that they had a broader view of the profession after training, and that they developed a network of colleagues to consult/collaborate with. Graduates indicated improved communication skills in professional and personal lives. Enhanced humility, commitment, confidence, and life-long learning skills were traits/values identified as positively impacting graduates professionally and personally. Life balance, family commitments, and marital strain were difficulties experienced during FT. Life situations varied greatly while in the program: 97% had a significant adult relationship, 57% had children, and 4% cared for elderly parents. Barriers to pursuing in-residence fellowship training included: 28% with the nearest mentor over a 2 hour drive away; and 46.7% with the nearest in-residence fellowship over 2 hours from home. 61% (n=75) would not have pursued FT if hybrid training were not available. **Discussion - Conclusions:** Graduate responses indicated a positive impact on multiple aspects of professional and personal lives. Graduates identified areas of growth and challenges in their personal lives while completing FT. The hybrid model provides physical therapy professionals access to FT that would not otherwise be possible.

KEYWORDS: Education, Fellowship

POSTER #34:

ABSTRACT ID: 2777039

**COMPARISON OF HEALTHCARE COSTS OF LATERAL EPICONDYLAGIA WHEN MANAGED WITH ORTHOPAEDIC MANUAL PHYSICAL THERAPY AND ADVANCED CLINICAL REASONING: A CASE REPORT**

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**Background & Purpose:** Lateral Epicondylagia (LE) is one of the most common upper extremity (UE) diagnoses treated in medical practice, and results in substantial healthcare costs and productivity loss. Management of LE often addresses local structures including the common extensor tendon. Research suggests other sources could be contributing to LE, such as referred pain from the cervical spine and/or the central nervous system via central sensitization. In many states, physical therapists now function with varying forms of direct access. However, no research thus far has assessed the cost effectiveness of early or direct referral to physical therapy (PT) for persons with LE. The purpose of this case report is to describe the successful use of spinal manual therapy (SMT) and advanced clinical reasoning in a patient with chronic elbow pain with a failed usual course of treatment. A secondary purpose is to compare the healthcare expenditures of medical and PT services. **Description:** A 40-year-old female presented to PT with a medical diagnosis of right (R) LE after sorting heavy boxes at work 6 months prior. Previous treatments included local injections and pain medication after repeated imaging and she was seen once in the emergency department due to no change in symptoms. The patient had to quit her job due to high pain levels and inability to work. Upon evaluation, patient demonstrated tenderness over extensor tendon mass, positive LE tests (Cozen's, Maudsley's, Mill's) and painful grip. Hypomobility and reproduction of LE pain was found with active cervical extension, upper limb neural provocation test 1a, and R sided unilateral posterior to anterior (UPA) accessory motion assessment at C7-T2. SMT included grade III R UPA mobilizations at the C7 level. **Outcomes:** The patient was seen for five sessions over 20 days. Elbow symptoms improved with cervical spine and neural non-thrust mobilizations. Outcomes included: Numeric Pain Rating Scale (worst pain) improved from 10/10 to 1/10, the QuickDASH improved from 11 to 0. Global Rating of Change of +7. She reported "Yes" on the Patient Acceptable Symptom State. The total cost of medical and PT services were \$3052.50 and \$1,168.00, respectively. **Discussion - Conclusions:** This case highlights the clinical reasoning and use of SMT in a patient with chronic elbow pain in a cost effective manner and the need for clinicians to examine proximal somatic structures as potential referral sources for distal extremity pain in a direct access setting. **KEYWORDS:** Cervicothoracic Manual Therapy, Lateral Epicondylitis, Clinical Reasoning.

POSTER #44:

CONTROL ID: 2777059

**CHRONIC HAMSTRING STRAIN AND SACROILIAC DYSFUNCTION  
FOLLOWING SURGERY FOR FEMOROACETABULAR IMPINGEMENT IN A  
RUNNER: A CASE REPORT AUTHORS**

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**Background & Purpose:** Sacroiliac joint (SIJ) pain has been reported to range from 13-30% of patients with persistent low back pain. Less data is available on the prevalence of SIJ dysfunction in patients with primary hip pathology, especially in an athletic population. This case study discusses SIJ dysfunction in a runner with left femoroacetabular impingement and chronic right posterior thigh pain. **Description:** A 34-year-old male who had undergone a left hip arthroscopic labral repair with a chondral lesion two years ago began experiencing right posterior thigh pain five months prior while training for a half-marathon. The physical therapy diagnosis was right biceps femoris musculotendinous strain. The primary impairment was identified as the lack of left hip flexion and a concomitant SIJ dysfunction. Although he underwent surgery for the FAI, he still presented with limited and painful left hip flexion and IR and had positive FABER, FADIR, and scour tests. Treatment included manual therapy to the SIJ and left hip with lumbar stabilization exercises emphasizing the posterior chain to improve force closure over the SIJ. The right hamstring was treated with instrumented assisted soft tissue mobilization (IASTM) and an eccentric strengthening program. **Outcomes:** He was treated for six weeks and experienced complete long-term resolution of symptoms, which were maintained at one year. Subjective reports of pain on the Numeric Pain Rating Scale (NPRS) improved from 5/10 to 0/10. His function, as noted on the Lower Extremity Functional Scale score improved from 56/80 to 80/80. The patient was able to complete the half-marathon without pain and achieved a personal best time. **Discussion - Conclusions:** This case highlights the regional interdependence between the SIJ, hip and hamstrings and the importance of regaining and maintaining hip flexion after FAI surgery. It also supports recent literature that questions the success of arthroscopic repair for FAI, especially in those with chondral lesions.

KEYWORDS: Hamstring , FAI, Sacroiliac Joint

PLATFORM #3

ABSTRACT ID: 2777155

**EFFECTS OF TACTILE FEEDBACK ON LUMBAR MULTIFIDUS MUSCLE ACTIVITY IN ASYMPTOMATIC HEALTHY ADULTS AND PATIENTS WITH LOW BACK PAIN**

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**Background & Purpose:** Reduced lumbar multifidus (LM) muscle contraction has been observed in patients with low back pain (LBP). Currently, considerable

evidence supports spinal stabilization exercises for treating LBP, including exercises for activating the LM muscle. Clinicians often use various strategies to ensure LM activation, including tactile feedback and verbal instruction. However, the effects of tactile feedback on muscle activation have not been studied previously. The purposes of this study were (1) to examine the effects of tactile feedback on lumbar multifidus muscle activity at rest, and (2) to compare the added effect of tactile feedback to verbal instruction during a contralateral arm lift, in adults with and without LBP. **Methods:** Twenty asymptomatic adults (9M, 11W, age: 31.7±10.5 years) and 20 patients with existing LBP (7M, 13W, age: 36.7±18.7 years) completed the study. Two sets of surface electrodes were applied to both sides of the LM at the L5 segment. Surface electromyographic (EMG) activity was collected three times at rest with and without tactile feedback, then five times during contralateral arm lifts with verbal instruction with and without tactile feedback. The tactile feedback was applied by direct and continuous hand contact to the bilateral LM over the lumbosacral area. Lastly, two 5-second trials of maximum voluntary isometric contraction (MVIC) during a bilateral arm lift were performed. EMG activity collected at rest and during contralateral arm lifts was normalized to that collected during MVIC. The average of the right and left LM EMG of the asymptomatic group, and the painful side of the LBP group, were used for data analysis. **Results:** Statistical analysis showed significantly decreased LM EMG activity with tactile feedback both at rest ( $p = 0.01$ ) and during contralateral arm lifts ( $p = 0.01$ ) compared to LM EMG activity without tactile feedback. There was no difference in LM EMG between groups. **Discussion - Conclusions:** The results of the study showed that adding tactile stimulation to verbal instruction appeared to result in an inhibitory effect on LM activity in both asymptomatic healthy adults and patients with LBP. Tactile feedback may produce a relaxation effect on LM. Contrary to common belief, tactical feedback via direct hand contact may reduce LM muscle recruitment, and may lessen the desired treatment effect.

KEYWORDS: Lumbar Spine, Electromyography, Muscle Activation

POSTER #16:

ABSTRACT ID: 2777474

**MANUAL PHYSICAL THERAPY FOR ANKLE FRACTURE HEALING AND EARLY MOTION IN NON- OPERATIVE ANKLE FRACTURE PATIENTS: A CASE SERIES**

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**Background & Purpose:** Reduced ankle motion and functional limitations are common challenges following ankle fracture. There is evidence that manual physical therapy targeted to specific impaired movements following

immobilization for fracture healing improves ankle motion and reduces functional limitations. It is not known whether physical therapy initiated earlier in the healing process may be able to stimulate ankle fracture healing while reducing the typical ankle motion loss that results from prolonged immobilization. The purpose of this case series was to observe and describe changes in a group of patients with stable distal fibula fractures with initial treatment by orthopaedic surgeons with a period of brief immobilization followed by early physical therapy to manually stimulate fracture healing and prevent ankle movement limitations. **Description:** Patients with stable distal fibula fractures (Weber B) were treated with short duration immobilization (one- three weeks) prior to physical therapy intervention aimed to promote fracture healing and prevent movement impairments. Manual therapy included the application of manually applied compressive oscillations across the fracture site theorized to promote fracture healing. Joint and soft tissue mobilization were also included and progressed based on stage of fracture healing. Additional interventions included self-movement strategies, and progressive weight- bearing. Progress was assessed at four, 12, and 18 weeks post-baseline using the Lower Extremity Functional Scale (LEFS) and Ankle Lunge Test (ALT). **Outcomes:** Three patients with distal fibula fractures started physical therapy early after injury (range, 8-25 days). Treatment ranged between 7-13 sessions over 18 weeks. Clinically meaningful improvements were observed in LEFS score (range, 13-27 points) and in the ALT (range, 6.0-13.3 cm) at four weeks. Further improvement was observed at 12 weeks and 18 weeks. Two of the three patients regained full motion and reported no functional deficits at 18 weeks. **Discussion - Conclusions:** The patients in this case series demonstrated clinically meaningful improvements in range of motion and self-reported function. These results suggest that further research into early physical therapy strategies targeted to promote fracture healing and maintain ankle motion is needed to determine the effectiveness in this population.

KEYWORDS: Fractures, Ankle, Manual Therapy

PLATFORM #46

ABSTRACT ID: 2777567

**THE USE OF CLINICAL PREDICTION RULES IN CLINICAL REASONING DURING STUDENT PHYSICAL THERAPIST OUTPATIENT CLINICAL EDUCATION EXPERIENCES**

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**Background & Purpose:** Clinical decision-making tools, such as clinical prediction rules (CPR), aid in clinical reasoning regarding many aspects of physical therapy practice and can be used to help establish a diagnosis, prognosis and treatment. It is recommended that CPR's are validated before implementation in clinical practice and undergo impact analysis to determine their effect on patient outcomes. CPR's have become increasingly prevalent in physical therapy; however, many have not been validated. The purpose of this study was to explore the use of CPR's in student physical therapist outpatient clinical education experiences. **Methods:** A cross-sectional electronic survey was conducted with a sample of 106, final year DPT students on their final clinical education experience. Students were requested to complete a survey at the end of their final outpatient clinical experience. Survey data queried students about clinic demographics, their clinical instructor's (CI) credentials, clinical practice patterns, how frequently they used CPR's, how useful CPR's were in clinical decision making, and specifically which CPR's were used. **Results:** The survey response rate was 68% (n=72). Students were in clinics located in 20 states throughout the US. All students reported using evidence-based practice to some degree and 83% of students reported utilizing clinical prediction rules to some degree. Only 3% of students reported CPR's were not at all useful while, 10% found them moderately useful, 51% moderately useful, 25% very useful and 11% extremely useful, in clinical decision-making. The most frequently utilized CPR's were the lumbar stabilization treatment by Hicks et al. (70%), cervical traction treatment by Raney et al. (61%), cervical radiculopathy diagnosis by Wainner et al. (58%), and Wells criteria for diagnosis of deep vein thrombosis (41%). Of the 16 students who reported using lumbar spine thrust manipulation techniques, 50% reported using the lumbar spine CPR by Flynn et al. for thrust manipulation treatment. **Discussion - Conclusions:** Student physical therapists appear to find CPR's useful for clinical decision making in outpatient clinical practice and reported a high level of utilization. Interestingly students reported utilizing CPR's that have not been validated in addition to those that have. Additional education is needed for students and clinical instructors regarding differentiation between validated and non-validated CPR's in clinical practice.

**KEYWORDS:** Clinical Prediction Rules, Clinical Reasoning, Student Physical Therapist

PLATFORM #43

ABSTRACT ID: 2777630

### **THE BENEFITS OF USING REAL-TIME ULTRASOUND TO TEACH KNEE TRACTION IN PHYSICAL THERAPIST EDUCATION**

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**Background & Purpose:** Historically, physical therapy students have struggled

with their skill and confidence when performing manual techniques for musculoskeletal examination. Current teaching methods lack objective visual and kinetic feedback. Real-time ultrasound imaging (RTUI) provides objective concurrent visual feedback of in-vivo joint changes. We hypothesize that the use of RTUI as an adjunct teaching method will result in a more effective knee traction technique and higher confidence scores when compared to students who learn through traditional teaching methods. **Methods:** Eighty-six students were randomly allocated to the control or experimental group. All participants received baseline instructions to perform long axis knee traction. The control group received standardized lab instruction (visual, video, and instructor feedback). The experimental group received standardized lab instruction augmented with RTUI feedback. Pre-data and post-data collection consisted of a student's ability to create changes in joint space while performing traction, a confidence survey and a one-minute reflection paper. Data was analyzed using a paired t-test within groups and between subjects. Qualitative data analyzed themes and descriptive statistics. **Results:** The use of RTUI to provide visual and kinetic feedback showed positive trends toward improving student confidence scores and improving effectiveness when students perform manual knee traction. There was no significance between groups post-intervention. According to the surveys, the top two preferences for learning manual therapy techniques prior to the intervention were instructor feedback and video instruction. Following the intervention students reported RTUI as one of their top two preferences for learning knee traction. **Discussion - Conclusions:** Although there were no statistically significant differences between the control and experimental group, a positive trend was found toward students showing more confidence in their skills when exposed to RTUI. Qualitative data suggest US imaging, as an adjunct-learning tool, may be an effective teaching strategy. Limitations may be due to inadequate RTUI exposure and insufficient practice time. More research is needed to determine if greater exposure to RTUI throughout the Doctor of Physical Therapy (DPT) curriculum would be beneficial for student learning. **KEYWORDS:** Education, Manual Skills, Ultrasound Imaging

PLATFORM #42

ABSTRACT ID: 2777918

**A COMPARISON BETWEEN HIP INTERNAL ROTATION MOBILIZATION TO POSTERIOR GLIDE AND THEIR EFFECTS ON HIP INTERNAL ROTATION**

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**Background & Purpose:** Proper hip range of motion (ROM) is crucial for completing everyday activities. With a lack of motion at the hip, often there is compensation in the lumbar spine. This can lead to low back pain, a diagnosis seen regularly in physical therapy clinics. A lack of hip internal rotation (IR) is

commonly seen due to an anteriorly translated femoral head. This study was done to compare a current manual therapy standard to a new technique to increase hip IR. Our hypothesis was that the new technique, the Hip Internal Rotation Mobilization (HIRM), will increase hip IR ROM more than the Posterior Glide. **Methods:** This was a three week program with 25 subjects split into three groups: HIRM with strengthening, Posterior Glide with strengthening, and control group. Subjects returned weekly for hip mobilizations and bilateral IR measurements. The Posterior Glide is done supine with the subject's hip in flexion and adduction, with a posterolateral mobilization at end range for 30 seconds. The HIRM is done sidelying with the hips flexed and three anterior forces applied to the posterior greater trochanter. Strengthening was performed on both hips, while the mobilization was done on the right hip. This used subjects as their own control to also compare the use of strengthening alone to strengthening and mobilizations used together. The chosen exercise was clamshells, which the subjects performed at home daily. This exercise strengthens the hip's posterior musculature to pull the femoral head back into a centered joint position, allowing for full hip IR. Data was analyzed as a mixed design study,  $\alpha=0.05$ . **Results:** No significant differences were found. There was a trend towards increased hip IR when a mobilization was used with strengthening when compared to strengthening alone. This indicates mobilizations should be utilized and that the HIRM is an equally effective treatment option. **Discussion - Conclusions:** Patients with low back pain typically do not enjoy lying supine. Thus, a sidelying mobilization will be more effective for these patients. The HIRM provides a more comfortable and efficient mobilization to increase hip IR, aiming to decrease the number of patients with low back pain. This original study provided an introduction to a new mobilization technique for increasing hip IR. Although there were not significant findings, favorable trends were found that encourage future research. Options include stretching hip external rotators, increasing subject size, or studying subjects specifically with low back pain.

KEYWORDS: Hip, Mobilization

PLATFORM #12

ABSTRACT ID: 2778027

### **RELIABILITY AND VALIDITY OF CERVICAL THORACIC DIFFERENTIATION TESTING IN THE TREATMENT OF INDIVIDUALS WITH NECK PAIN**

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**Background & Purpose:** Thoracic manipulation has been reported to decrease

pain and improve function in patients with neck pain. However, it is not known if clinical tests can accurately predict which individuals with neck pain will respond more favorably to this treatment. Cervical Thoracic Differentiation Testing (CTDT) is proposed to discern the source of pain as originating from either the cervical or thoracic regions of the spine, thus directing treatment to the appropriate region. Cervical and thoracic unloading (distraction) tests have also been proposed to help identify the appropriate target area. To our knowledge, these tests have not been previously tested for reliability or validity. **Methods:** To assess inter-rater reliability, two blinded examiners performed the CTDT, as well as cervical and thoracic unloading tests. For each test, symptom relief was considered to be a positive result, and no change/worsening pain a negative result. Neck pain was assessed using a 100 mm visual analog pain scale (VAS), both at rest and with movement into the individual's most painful position. The study intervention consisted of supine thoracic thrust manipulation applied to an investigator-identified level between T1-T4. Post-intervention, subjects repeated the VAS. Change in pain pre-post manipulation was compared to the subject's test results (positive/negative) for data analysis. **Results:** A total of 48 subjects (30.78 years, 29 female, 19 male) participated in the trial; the first 20 participated in the reliability analysis. All three tests demonstrated high levels of inter-rater reliability,  $K=0.898$ . Individuals with a positive CTDT demonstrated significantly greater changes in pain with provocative motion (pos. test  $-29.80\text{mm}$ , neg. test  $-17.80\text{mm}$ ,  $p=0.02$ ) and at rest (pos. test  $-10.82\text{mm}$ , neg. test  $-3.27\text{mm}$ ,  $p=0.013$ ). There were no significant between group differences based on unloading test results. There was a clinically significant difference in proportion of responders (pain relief beyond MCID) to thoracic manipulation based on CTDT response ( $p=.002$ ). Calculations of clinical utility yielded the following values: sensitivity: 0.69, specificity: 0.89; LR+ 6.23 (0.97,40), LR- 0.35 (0.20,0.58). **Discussion - Conclusions:** The CTDT is a specific test with significant clinical utility to identify individuals with neck pain who will experience immediate pain relief beyond MCID following thoracic manipulation. The CTDT should be considered as part of the clinical decision making process for the treatment of individuals with neck pain.

**KEYWORDS:** Neck Pain, Thoracic Spine Manipulation, Regional Dysfunctions

POSTER #7:

ABSTRACT ID: 2778071

**CONSIDERATIONS IN MANAGEMENT OF A PATIENT WITH EHLERS DANLOS SYNDROME UNDERGOING SEQUENTIAL BILATERAL TOTAL KNEE ARTHROPLASTY: A CASE REPORT**

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**Background & Purpose:** Ehlers Danlos Syndrome (EDS) is characterized by

hypermobile joints and skin leading to instability, soft tissue injuries and arthritis. Adjusting post-operative care for patients with connective tissue disorders is considered imperative for successful rehabilitation. The purpose of this paper is to discuss two different approaches to rehabilitation of a patient with EDS post total knee arthroplasty (TKA). **Description:** A 50-year-old female with EDS underwent Right (R) TKA. Per physician and physical therapist (PT) agreement, management plan was to limit range of motion (ROM) to 0-10-90 degrees in a ROM limiting brace for one month. ROM was progressed 10 degrees in brace each week until 0-5-120 degrees knee ROM was reached in order to protect against hyperextension of the knee prior to obtaining appropriate quadriceps strength. However, she was unable to obtain ROM goals after the brace was removed. PT and physician identified excessive scarring as the likely limiter of ROM, despite underlying tissue hypermobility. This was likely due to initial four weeks in brace. Interventions focused on improving ROM through manual therapies of mobilizations, PNF stretching, Mobilization with Movement and other manual therapies; however, functional ROM was not achieved after 24 visits. One year later a primary Left (L) TKA was performed. Management plan was changed to eliminate ROM restrictions and allowed for quick gains of ROM with priority on quad strength. In second episode of care, emphasis was placed on early, manual interventions including mobilizations of patella, fibular head and tibial femoral joints. **Outcomes:** Following 24 visits for her R knee post-operatively, her ROM had improved from 0-15-90 to 0-5-115 and her Lower Extremity Functional Scale (LEFS) improved from 15/80 to 49/80, exceeding the MCID. Following only 12 visits for her L TKA, she had similar results. Her ROM had improved from 0-11-104 to 0-1-119 and her LEFS improved from 7/89 to 32/80. She was also able to use a reciprocal pattern on stairs following her L TKA. While her LEFS score was not as high for the L TKA, she reported "excellent" results with L TKA compared to "fair" with R TKA. **Discussion - Conclusions:** In the presence of EDS, frequent review of ROM early on in the course of post-operative care may prevent negative outcomes associated with overly protective protocols. Further research may be warranted examining post operative protocols in the presence of EDS, such as bracing and early manual therapies.

KEYWORDS: Total Knee Arthroplasty

PLATFORM 34

ABSTRACT ID: 2778248

**CERVICOTHORACIC JUNCTION MANIPULATION VERSUS PLACEBO ON SHOULDER MUSCLE STRENGTH, ELECTROMYOGRAPHIC AMPLITUDE, AND PAIN IN PARTICIPANTS WITH SUBACROMIAL IMPINGEMENT SYNDROME**

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**Background & Purpose:** The effectiveness of rotator cuff strengthening and scapular stabilization training at improving pain and disability in patients with subacromial impingement syndrome (SAIS) is known. Although cervicothoracic junction (CTJ) manipulation has been effective for reducing shoulder pain and improving shoulder motion in patients with SAIS, its effect on shoulder strength and muscle activity has not been studied. The purpose of this study was to examine the efficacy of CTJ manipulation, as compared to placebo, on 1) shoulder external rotation (ER) muscle strength during a maximal voluntary isometric contraction (MVIC), 2) muscle activity of the middle deltoid (MDEL), supraspinatus (SUPR), and infraspinatus (INFR) muscles during MVIC of shoulder ER, and 3) pain in patients with SAIS. **Methods:** Thirty-two participants with SAIS were randomly assigned into two treatment groups: manipulation group (n = 16) and placebo group (n = 16). Shoulder ER muscle strength was measured using hand-held dynamometry. Surface electromyographic (EMG) activity was recorded from the MDEL, SUPR and INFR muscles during shoulder ER MVIC strength test. The Numeric Pain Rating Scale (NPRS) was used to assess shoulder pain level. All outcome measures (muscle strength, EMG activity and pain level) were assessed at baseline, and immediately, 15 minutes, 30 minutes, 45 minutes, 48-72 hours, and 6-7 days after intervention. **Results:** The results of this study showed no significant difference between groups over time in the shoulder ER strength, the EMG amplitude of the SUPR and INFR muscles, and the NPRS ( $p > 0.05$ ). However, a significant difference was found in the MDEL muscle between groups between 45 minutes and 48-72 hours after intervention: the manipulation group had significant increased muscle activity. This coincided with the placebo group having significantly reduced muscle activity. The results showed that all participants had significant pain reduction over one week. **Discussion - Conclusions:** Although CTJ manipulation reduced shoulder pain significantly, the CTJ manipulation did not result in changes of shoulder ER muscle strength or shoulder muscle activity. The results indicate no differences between groups with shoulder ER muscle strength nor shoulder EMG activity. There was a decrease in pain using the NPRS across both groups, but it was not statistically significant. The results suggest that both the manipulation and placebo techniques had a positive effect on pain, which lasted up to one-week post treatment. **KEYWORDS:** SHOULDER PAIN, REGIONAL INTERDEPENDENCE, Manipulation

PLATFORM #4

ABSTRACT ID: 2778279

**MEASURING CLINICAL REASONING ACROSS A PHYSICAL THERAPY CURRICULUM: A PILOT STUDY AUTHORS**

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**Background & Purpose:** Clinical reasoning is a multi-faceted skill set crucial to optimal patient care. The ability to assess development of physical therapist students and residents has been challenging. A clinical reasoning grading rubric was recently developed in order to assess students' progress in three domains of clinical reasoning (content knowledge, procedural knowledge and conceptual knowledge). The purpose of this study was to determine if the use of a clinical reasoning grading rubric would demonstrate student progress in acquisition and application of clinical reasoning skills across didactic and clinical components of a DPT curriculum. **Methods:** A clinical reasoning grading rubric was utilized at four specific time points across two years of a physical therapy curriculum: a clinically based practical exam (early year 1), a standardized patient simulation experience, a clinical experience and a second standardized patient simulation experience. Fifty-five students from two consecutive class cohorts were assessed with this rubric resulting in a total of 172 grading rubrics scored by 10 assessors. Students were scored on a visual analog scale (VAS) that from left to right read: beginner, intermediate, competent and proficient. The VAS was scored and later analyzed using a 0-16 scale for each clinical reasoning domain. Analysis of variance (ANOVA) was used to determine if time was a predictor of performance in each of the three clinical reasoning domains at each specified time point. **Results:** Mean scores in each of the domains steadily increased at each time point. Results of the ANOVA showed that each specified time point within the DPT curriculum was significantly predictive of performance in each the three domains of interest ( $p < 0.0001$  for each). Qualitative data, collected using the open comment boxes on the clinical reasoning tool, were used to further substantiate the quantitative results as meaningful exemplars of growth in each of the three domains of clinical reasoning. **Discussion - Conclusions:** Few clinical reasoning tools are available that are structured to identify specific domains within clinical reasoning and demonstrate the capability of mapping the development and progression of clinical reasoning across a curriculum in both didactic and clinical components. The results of this study demonstrate the potential utility of this clinical reasoning grading rubric to measure the performance of physical therapy students in domains of clinical reasoning across a physical therapy curriculum.

**KEYWORDS:** Education, Clinical Reasoning, Student Physical Therapist

POSTER #8:

CONTROL ID: 2778416

**ORTHOPEDIC MANUAL PHYSICAL THERAPY AND DRY NEEDLING  
APPROACH FOLLOWING A PERIACETABULAR OSTEOTOMY: A CASE  
REPORT**

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**Background & Purpose:** Hip labral reconstruction was introduced in 2009, and has become a common procedure. When hip dysplasia is present, a periacetabular osteotomy (PAO) is then performed to reposition the hip socket. Currently evidence is limited in orthopedic manual physical therapy (OMPT) involving dry needling (DN) for this procedure. This case study describes the use of OMPT techniques and DN to improve functional outcomes following a multi-stage hip surgery. **Description:** A 36-year-old female with a five-year progressive history of sharp, stabbing pain in her anterior and lateral right hip presented post labral reconstruction and PAO. She had functional limitations with all sports/activities/hiking and recently with ambulation. Initial limitations included weight bearing limitations for a total of 12 weeks, including six weeks, non-weight bearing, hypomobility, edema, poor endurance, muscle weakness, functional ambulation limitations and impaired motor function. She reported referral pain with trigger point to the right iliacus, rectus femoris, vastus lateralis and gluteus medius musculature which were addressed with dry needling techniques. Manual therapy included multi-joint and soft tissue mobilization, thrust manipulation, nerve gliding techniques and DN. DN was performed on the right iliacus, rectus femoris, vastus lateralis, tensor fascia latae, gluteal muscles and L2-5 segmental multifidi to reduce pain and muscle tension, improve muscle activation and range of motion (ROM). She demonstrated regular improvement within session in pain reduction, ROM and muscle activation. Other treatment included gait training, core and lower extremity strengthening, flexibility, balance, and stabilization exercises and pain science education. **Outcomes:** After seven months, the patient's LEFS improved from 9/80 to 62/80 and Modified Harris Hip Score improved from 28% to 90% ability. Her NPRS improved from 9/10 to 3/10 with single limb squatting. **Discussion - Conclusions:** The inclusion of OMPT including DN helped improve her functional recovery and she resumed most activities including all daily functions, light hiking and has continued her home management program regularly to achieve her goals and obtain maximal functional improvement. This case report demonstrates the importance of including DN in OMPT interventions for patients following PAO to achieve optimal functional outcomes.

**KEYWORDS:** Dry needling, Hip Labrum, Manual Physical Therapy

PLATFORM 26

ABSTRACT: 2778418

**REVERSAL OF UPPER MOTOR NEURON SIGNS WITH NON-SURGICAL MANAGEMENT OF A PATIENT WITH CERVICAL SPONDYLOTIC MYELOPATHY: A CASE REPORT**

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**Background & Purpose:** Cervical spondylotic myelopathy (CSM) is a common condition generally thought to warrant surgical intervention. Encroachment on the spinal cord can lead to neurological involvement, progressive clinical signs, and significant disability. However, little agreement is found on the natural progression of the disorder. There is minimal evidence showing benefit of surgical versus conservative care, with some studies demonstrating no difference in outcomes between the two. The purpose of this case report was to describe the conservative management of a patient with clinically diagnosed CSM using manual therapy, postural reeducation, and therapeutic exercises. **Description:** A 76-year-old male presented with severe pain in bilateral posterior shoulders and upper arms, bilateral hand tingling, and difficulty grasping and writing. He had positive upper motor neuron signs bilaterally, including Hoffman's sign, hyperreflexia in the upper and lower extremities, ankle clonus, and up-going Babinski reflex. A clinical diagnosis of cervical myelopathy was made based on a well-defined cluster of positive examination findings. The patient rated his average pain as 8/10 on the Numeric Pain Rating Scale. He had a QuickDASH score of 45. He was treated with manual therapy including central and unilateral oscillatory posterior to anterior mobilization of the C4-T4 segments (Grade III-IV). Postural reeducation and scapular strengthening were also included in his treatment plan. **Outcomes:** Following two sessions of physical therapy, the patient had negative upper motor neuron signs. Following nine sessions in total over five weeks the patient's QuickDASH score improved to 33. His average pain improved to 2/10 on the NPRS. He was able to continue with normal daily activities without additional intervention or surgery. **Discussion - Conclusions:** This case describes the successful management of a patient with clinical diagnosis of CSM using orthopedic manual physical therapy, postural reeducation, and scapular strengthening. Signs of upper motor neuron involvement were reversed within two sessions. This could represent alteration in descending inhibition from supraspinal structures or biomechanical changes in the cervical spine leading to decreased compression on spinal cord structures. Manual physical therapy may be an effective modality in the treatment of patients with CSM and its efficacy should be further investigated.

**KEYWORDS:** Myelopathy, Spondylolysis, Manual therapy

PLATFORM #21

ABSTRACT ID: 2778893

**USE OF LOW LOAD, HIGH VOLUME EXERCISE AND MANUAL PHYSICAL THERAPY FOR TWO YOUNG ADULTS FOLLOWING ACUTE RHABDOMYOLYSIS: A DOUBLE CASE REPORT**

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**Background & Purpose:** There is limited evidence to guide the role of physical therapy in treatment of the sequelae of acute rhabdomyolysis, which may include muscle pain, weakness, fatigue, gait disturbance, exercise intolerance, and inability to perform physical work. This double case report highlights the use of high volume, low load resistance exercise and manual physical therapy in the treatment of two young adult patients following episodes of rhabdomyolysis, one exercise-induced and one drug-induced. **Description:** Patient 1 is a 20-year-old female who was hospitalized for acute exertional rhabdomyolysis following a coached, high-intensity workout. She also developed thoracic spine pain and stiffness from the workout. Three weeks post episode, rhabdomyolysis symptoms of extremity muscle pain and fatigue were unresolved; she was unable to walk or attend classes on her urban college campus. She was treated for 12 sessions over six weeks of high-volume, low-load exercise for muscle pain and fatigue, as well as manual mobilization and postural exercise for acute thoracic spine dysfunction. Patient 2 is a 24-year-old male, hospitalized in a three-day coma following a drug overdose. He developed neck and arm pain from prolonged intubation, and metabolic rhabdomyolysis. Five weeks post episode, rhabdomyolysis symptoms were unresolved. He was treated for 14 visits over seven weeks with exercise similar to patient 1, plus manual traction and cervical motor control training for symptoms of cervical radiculitis. **Outcomes:** Both patients experienced longer than expected pain, fatigue, and functional limitation prior to starting physical therapy. Patient 1: Lower Extremity Functional Scale (LEFS) improved: 23 to 67. Disability of Arm/Shoulder/Hand (DASH) improved: 43 to 7. Numeric Pain Rating Scale (NPRS) improved: 8/10 to 3/10. Global Rating of Change (GROC) at discharge was +6. She was able to return to classes, completing the semester on her urban college campus. Patient 2: LEFS score improved: 57 to 72. DASH improved: 36 to 0. NPRS improved: 9/10 to 0/10. GROC was +7. He returned to work as a grocery stock clerk. **Discussion - Conclusions:** Muscle pain and fatigue from rhabdomyolysis typically resolve within 7-14 days. These two patients had different mechanisms of onset of rhabdomyolysis, but experienced similar prolonged pain and fatigue. Both benefited from six-eight weeks of high-volume low-load exercise for pain modulation and tissue healing, as well as manual therapy treatment for concurrent musculoskeletal injuries.

**KEYWORDS:** Exercise, Manual Physical Therapy, Musculoskeletal Pain

POSTER #41:

ABSTRACT ID: 2778908

**IMPROVED VIBRATION DETECTION THRESHOLDS IN A RUNNER WITH NON-TRAUMATIC ANKLE INSTABILITY FOLLOWING SPINAL MANUAL THERAPY: A CASE REPORT**

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**Background & Purpose:** Ankle instability is common following ankle injuries, contributing to functional deficits that affect quality of life. Evidence supports an association between vibratory hypoesthesia and proprioceptive deficits in those with chronic musculoskeletal conditions, although few studies have examined these deficits in those with non-traumatic ankle instability. Manual therapy at the ankle has shown to be effective for improving function in those with ankle instability; however, the effects of spinal manual therapy in this population have rarely been studied. The purpose of this case report was to describe improved vibration detection threshold (VDT) and perceived ankle instability following spinal manual therapy in a patient with non-traumatic ankle pain. **Description:** A 32-year-old female runner presented with a two-month history of insidious onset of right posterolateral ankle pain and instability while training for a race utilizing a “Couch to 5K” program. She reported shooting pain from the ankle into the lateral foot limiting her ability to walk without a Cam boot. Lumbar active motion was full range and pain-free. Neurological examination was negative, except for decreased VDT at the lateral malleolus. Slump and straight leg raise reproduced her ankle pain. Passive accessory joint assessment revealed posterolateral lower leg & foot pain/paresthesia with a right unilateral posterior-anterior (PA) glide to the L5-S1 facet. Ankle dorsiflexion was limited. Balance was impaired. The patient was treated using a grade III unilateral PA glide at the L5-S1 facet and grade III anterior-posterior glide at the talocrural joint in addition to therapeutic exercise and balance training. Lumbar joint mobilizations were specifically found to improve pain and VDT in this patient. **Outcomes:** The patient was seen for 15 sessions. VDT normalized, Foot and Ankle Ability Measure (FAAM) ADL and sport scores improved from 67/84 to 84/84 and 19/28 to 27/28 respectfully, Cumberland Ankle Instability Tool (CAIT) score improved from 7/30 to 26/30, and Anterior Star Excursion Balance Test (SEBT) improved by 10 cm. Ankle pain resolved and the patient successfully returned to running. **Discussion - Conclusions:** This case highlights the successful use of spinal manual therapy in a patient with non-traumatic lateral ankle pain and instability. Subclinical findings of vibrational hypoesthesia in those with ankle instability may be associated with altered proprioception; thus, VDT may serve as an important clinical measure in this population.

KEYWORDS: Ankle Pain, Vibration perception, Lumbopelvic Manipulation

POSTER #55:

ABSTRACT ID: 2779250

**RECURRENT MEDIAL TIBIAL STRESS SYNDROME AND PATELLOFEMORAL PAIN SYNDROME TREATED WITH INTERNAL TIBIAL ROTATION MOBILIZATION WITH MOVEMENT IN COMPETITIVE RUNNER: A**

## CASE REPORT

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**Background & Purpose:** Both medial tibial stress syndrome (MTSS) and patellofemoral pain syndrome (PFPS) are common problems in both casual and competitive runners with a high rate of reoccurrence. One common aspect that has not been well studied is internal tibial rotation (ITR). While ITR has been researched biomechanically, there is an absence of published research regarding its clinical assessment and treatment. This case study describes its possible clinical relevance in these conditions. **Description:** A 26-year-old male patient, with four-year a history of right (R) recurrent MTSS and PFPS, was referred after failing to progress during the previous month of physical therapy (PT). Although he had progressed (improved Lower Extremity Functional Scale [LEFS] from 44/80 to 62/80) during the first two months of PT addressing lower quarter mobility and strength, he failed to make further progress during the last month. He was unable to run greater than 4 km without an increased pain of 5-6/10 on the Numeric Pain Rating Scale (NPRS) that resolved to 2/10 over a two day period. The current exam demonstrated normal findings for the lower quarter neurological screen, manual muscle testing, and range of motion except for the following: R ITR was 2° compared to left (L) 24°. Dorsiflexion (DF) was R 8° / L (left) 22° open chain (OC) and R 20° / L 46° closed chain (CC). R distal tibiofibular posterior glide (TF-PG) was hypomobile. A lateral displacement of the right patella compared to the left was noted. The patient was treated once a week for four weeks with mobilization with movement (MWM) of ITR, and MWM with the TF-PG for DF each demonstrating a decrease in overall pain level. Mulligan Taping applied to reinforce the ITR and the TF-PG. The patient home exercise program consisted of self-MWM for ITR, self-MWM for TF-PG for DF, and a progressive running program. **Outcomes:** Following treatment, he reported an LEFS score of 78/80 and an NPRS of 0/10. He reported his runs increased it to 2/10 pain lasting an hour after running 10 km. The R ITR was 22°. R dorsiflexion was 24° OC and 44° CC. The R TF-PG and patellar positioning were comparable to the L side. These results were maintained at six months with no further pain noted after running. **Discussion - Conclusions:** This case study demonstrated the successful management of MTSS and PFPS with addressing ITR. However further research needs to be completed to determine its role and clinical implications.

**KEYWORDS:** Mobilization with movement, tibiofemoral mobilization, Ankle.

Platform #:32

Abstract ID: 2779854

**RECRUITMENT OF THE TRANSVERSE ABDOMINIS DURING SELECTED**

## **THERAPEUTIC EXERCISES AS MEASURED BY REHABILITATION ULTRASOUND IMAGING**

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**Background & Purpose:** Therapeutic exercise for deep stabilizing muscles of the spine have demonstrated effectiveness in the managing low back pain (LBP). Training of the Transverse Abdominis (TA) has revealed increases in muscle thickness (MT). Rehabilitation Ultrasound Imaging (RUSI) is a valid method for assessment of TA thickness and muscle activation. The TA serves an important role in providing spinal stability and reducing LBP. There is a paucity of evidence for identification of specific exercises for activation of the TA. The purpose of this study was to identify which therapeutic exercises are most effective in facilitating activation of the TA. **Methods:** Thirty students between 18-25 years of age with no complaint of LBP. RUSI probe was placed at a distance halfway between the right iliac crest and 12<sup>th</sup> rib along anterior axillary line, 10 centimeter (cm) lateral to midsagittal plane. Pressure biofeedback captured an image of TA at rest and during activation using Abdominal Drawing In Manuever (ADIM). Each subject was randomly assigned a sequence of 10 exercises, performed alternately on either a stable or unstable surface. Analysis of RUSI data, that compared MT of the TA during each exercise to MT of the TA during the ADIM and at rest, was performed in a blinded fashion. **Results:** Repeated measures ANOVA revealed that all exercises were significant predictors of TA thickness ( $p < 0.05$ ). Bonferroni Post Hoc tests revealed that the stable/unstable chop, stable/unstable supine curl-up, and stable/unstable swimmer were all comparable to the ADIM ( $p > 0.05$ ) and significantly better at recruiting the TA than stable/unstable planks and stable/unstable right-sided planks. Furthermore, the unstable PNF chop showed a significant main effect when compared to stable supine curl-up ( $p = 0.005$ ), unstable supine curl-up ( $p = 0.001$ ), stable swimmer ( $p = 0.01$ ), and unstable swimmer ( $p = 0.023$ ). **Discussion - Conclusions:** The stable/unstable PNF chops, swimmer, and supine curl-up exercises were comparable to the ADIM in regards to TA activation. The unstable PNF chop revealed statistically better TA activation than the stable/unstable swimmer and supine curl-up. In conjunction with the ADIM, exercise regimens for individuals with LBP should incorporate these exercises, and particularly the PNF chop, when targeting the TA for spinal stability. In contrast, the inclusion of stable/unstable planks and right-sided planks should be reconsidered. Future research is needed to determine the efficacy of these exercises in a population of individuals with LBP.

**KEYWORDS:** Exercise, low back pain, stabilization

Poster #: 1

ABSTRACT ID: 2780162

## **MANAGEMENT OF PERSISTENT POST-ROTATOR CUFF REPAIR STIFFNESS WITH COMBINATION OF IMPAIRMENT-BASED MANUAL**

## **THERAPY APPROACH, AND INDIVIDUALIZED EXERCISE AND HOME MANAGEMENT PROGRAM: A CASE REPORT**

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**Background & Purpose:** Postoperative stiffness is the most common complication of arthroscopic rotator cuff repair with occurrence rate as high as 32%. Arthroscopic release is typically recommended for stiffness that persists an average of nine months after rotator cuff repair. Manual therapy has been used in treatment of shoulder conditions. However, there is paucity of studies utilizing manual therapy for post-rotator cuff repair stiffness. The objective of this case is to describe manual therapy, an individualized exercise, and home management program in the treatment of persistent stiffness after a repair of rotator cuff tear (partial articular-sided tendon avulsion (PASTA) type). **Description:** A 48-year-old female, who was 11 months status post right partial articular-sided tendon avulsion (PASTA) repair presenting, presented with persistent shoulder stiffness. Although she had received six months of traditional postsurgical physical therapy (PT) comprising of modalities, soft tissue mobilization, general joint mobilization and shoulder exercises as dictated by recommended post-rotator cuff repair protocol, her primary complaint was difficulty reaching behind her back to hook her bra. An arthroscopic release was suggested by her orthopedic surgeon, but patient opted for more manual therapy-based PT instead. The patient attended a total of eight PT sessions over six weeks with treatment consisting of thoracic thrust manipulation, glenohumeral joint mobilization following Maitland principle, Mulligan's mobilization with movements (MWMs), and utilization of specific exercise or home management as indicated by McKenzie principle's directional preference and patient response with MWMs. **Outcomes:** Pain with activities was reduced from 6/10 to 2/10 at worst on the Numeric Pain Rating Scale. Hand behind back motion was improved by seven vertebrae levels (from L4 to T9). Self-report outcome measures results were as follows: Quick Dash disability score was reduced from 32 (initial visit) to 11 (final visit). Global Rating of Change Scale improved from +3 (at the 4<sup>th</sup> visit) to +6 (at the 8<sup>th</sup> visit). **Discussion - Conclusions:** In this case, a combination of impairment-based manual therapy and individualized exercise and home management program based on directional preference response was successful in the treatment of persistent shoulder stiffness after PASTA type rotator cuff repair. This approach highlights the clinical reasoning in the post-rotator cuff repair stiffness, enabling the patient to avoid further surgery.  
**KEYWORDS:** Rotator Cuff Repair, Stiffness, Manual Therapy

Platform #10

Abstract ID: 2780504

**PRESSURE PAIN THRESHOLD, SELF-REPORTED PAIN AND WALKING SPEED IN PEOPLE WITH END STAGE ANKLE OSTEOARTHRITIS: A PILOT**

## STUDY

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**Background & Purpose:** End stage ankle osteoarthritis (OA) is painful and debilitating. Pain, reduced ankle motion, and decreased walking speed characterize ankle OA. Importantly, loss of ankle motion is hypothesized to create increased adjacent joint stress during gait, potentially expanding the local pain response beyond the ankle. Hyperalgesia, as measured by pressure pain threshold (PPT), is linked to increased pain and impaired function in people with knee OA. While not yet investigated, PPT may also be a biomarker of pain linked to function in people with ankle OA. The purpose of this pilot study was to examine ankle and adjacent foot joint PPT in relation to self-reported pain and walking speed in people with end stage ankle OA. **Methods:** Six adults with unilateral end stage ankle OA, defined by radiographic imaging, participated [Mean (SD): Age 56.7 (18.2) years; BMI 29.1 (3.2) Kg/m<sup>2</sup>; 100% male]. The Numeric Pain Rating Scale (NPRS) was used to record worst pain during the past week. Each subject completed the Six Minute Walk Test (SMWT). Subjects laid semi-supine with feet supported on a custom built examination board for PPT testing. The pressure algometer (JPX, Wagner, CT) was applied to the ankle, naviculocuneiform (NC), and first metatarsalphalangeal (MTP) joints of both limbs at 40 kPa/s. Wilcoxon Signed Rank Tests were used to assess differences in PPT between ipsilateral and contralateral sites. Spearman's Rank-Order correlations were used to assess relationships between NPRS, SMWT and ankle PPT data. **Results:** Involved limb ankle PPT was significantly higher than involved limb MTP PPT ( $p = .03$ ) and non-involved limb ankle PPT [378.8 (74.5) vs. 258.2 (37.9) kPa;  $p = .03$ ]. Involved limb NC PPT was significantly lower than the non-involved limb [307.5 (58.7) vs. 411.0 (82.9) kPa;  $p = .03$ ]. Significant inverse relationships were noted between ankle PPT values and NPRS scores ( $\rho = -.93$ ;  $p = .01$ ) and the SMWT ( $\rho = -.81$ ;  $p = .04$ ). **Discussion - Conclusions:** While increases in ankle hyperalgesia were associated with increased self-reported pain, adjacent joint hyperalgesia may be more robust than ankle joint hyperalgesia in people with end stage ankle OA. It is possible that pain avoidant gait patterns contributed to the unexpected relationship between increased walking speed and increases in ankle hyperalgesia. However, since joint mobilization to hyperalgesic joints can enhance conditioned pain modulation, joint mobilization to adjacent joints in people with ankle OA may improve patient reports of pain.

KEYWORDS: ANKLE PAIN, Osteoarthritis, Pain Pressure Threshold.

Platform #22

Abstract ID: 2780653

**A PRELIMINARY ANALYSIS OF OUTCOMES AND END RANGE PROCEDURES USED TO ACHIEVE CENTRALIZATION IN PEOPLE WITH LOW BACK PAIN**

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**Background & Purpose:** To investigate the relationship between clinical outcome and the types of end range procedures used to achieve centralization in a sample of patients with low back pain (LBP) and/or peripheral symptoms. **Methods:** Small sample retrospective analysis of an observational cohort. Patients with LBP and who centralized during initial visit at two physical therapy clinics were recruited to participate. The types of end range procedures used to achieve centralization were documented during each office visit and a chart review was performed after four weeks. Outcomes were determined by improvement in the Oswestry Disability Index (ODI) score after four weeks. Statistical analysis determined the association between the types of end range procedures and outcomes. **Results:** Thirty-one patients gave consent to participate. Nineteen patients met inclusion criteria and were included in data analysis. After 4 weeks, the improvement in mean ODI scores was  $15.89 \pm 16.28$ . Differing end range procedures were used to achieve centralization within this cohort. The types of end range procedures used to achieve centralization were not significantly associated with outcomes. **Discussion - Conclusions:** The results observed in this study promote exhausting many different types of end range procedures to determine if centralization can be achieved. Limiting the end range procedures used to achieve centralization may fail to identify patients who can achieve centralization and subsequently have positive clinical outcomes. Larger cohort studies investigating relationships between outcomes and the types of end range procedures used to achieve centralization would contribute to management of people with LBP.

KEYWORDS: centralization, low back pain, outcome

Poster #38:

Abstract ID: 2780833

**REGIONAL INTERDEPENDENCE FOR ASSESSMENT AND TREATMENT OF LATERAL KNEE PAIN IN A RUNNER: A CASE REPORT**

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**Background & Purpose:** A functional interrelationship has been reported between the psoas, thoracolumbar junction (TLJ), lumbosacral junction (LSJ), sacroiliac (SI) joint, and hip. This reflects the concept of regional interdependence (RI) as impairments in a remote region may contribute to a primary complaint. When applying RI to the psoas, it has been proposed that once this muscle becomes facilitated, associated structures may become dysfunctional. The purpose of this case report is to describe clinical utilization of the regional interdependence model with focus on the TLJ, the LSJ, the SI joint, and hip to treat lateral knee pain. Evaluation and treatment of these specific structures may be beneficial in order to attain optimal outcomes in cases with the sole presentation of knee pain. **Description:** A 33-year-old female runner was referred to physical therapy with a diagnosis of progressive right (R) knee pain for six months despite using ibuprofen and adjusting work ergonomics. Her main complaint was vague 7/10 (Numeric Pain Rating Scale) at her R lateral knee pain that worsened with running more than a mile. She presented with decreased thoracic, lumbar, SI joint mobility, decreased R hip internal rotation, decreased hamstring flexibility. She also had poor weight bearing neuromuscular control of her R hip external rotators and gluteal musculature. It was hypothesized that the muscle and joint imbalances throughout her lower quadrant lead to biomechanical deficits and increased knee pain with running. Specific manual therapy techniques were implemented for the TLJ, LSJ, SI joint, and hip. Neuromuscular re-education and therapeutic exercise were utilized to improve function and decrease pain. **Outcomes:** After six weeks of manual therapy and appropriate exercise progression she achieved clinically meaningful improvements in pain, range of motion, strength, and was able to return to symptom free running. **Discussion - Conclusions:** This case emphasizes RI examination and treatment of proximal structures which lead to biomechanical improvements and decreased knee pain. Treatment incorporating the involved proximal structures including specific manual techniques followed by neuromuscular re-education and therapeutic exercise was beneficial to improve function.

KEYWORDS: Knee, Regional Interdependence, Manual Physical Therapy

Poster #35:

Abstract ID: 2781329

**A CASE REPORT: SHOULD THORACIC THRUST AND NON-THRUST MANIPULATION BE CONSIDERED DURING REHABILITATION OF A ROUTINE ANKLE SPRAIN?**

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**Background & Purpose:** Thoracic thrust/non-thrust manipulation has been shown to affect the central nervous system and provide pain reduction for many

regional pathologies. However, there is very little information in the literature regarding the effects of thoracic manipulation on foot and ankle dysfunction. The purpose of this case is to present thoracic thrust/non-thrust manipulations as potential rehabilitation tools for a common ankle sprain. **Description:** A 40-year-old female presented with a left (L) ankle inversion sprain. Imaging confirmed the diagnosis as a complete "anterior talofibular ligament tear." Pain complaints included thoracic "stiffness" and "ache/stretch" over the L lateral malleolus and foot. Functional issues included ankle swelling after prolonged walking, poor balance on uneven terrain, and ankle pain when using stairs. Objective findings demonstrated: L ankle weakness of 4/5, limited left ankle dorsiflexion and plantar flexion (9-0-38°), left ankle swelling, a positive L lower extremity slump test, and mid- thoracic passive accessory hypomobility. Outcome measure scores from the evaluation were from 0/10 to 7/10 on the Numeric Pain Rating Scale (NPRS), and 57/80 on the Lower Extremity Functional Scale (LEFS). Intervention started with thoracic non-thrust manipulation and was followed by thoracic thrust manipulation (visits 4-7 only), with ankle girth being measured prior to the non-thrust and immediately after the thrust manipulations. Self-mobilization and strengthening and stretching exercises were issued and progressed during the remainder of each session. **Outcomes:** Seven treatment sessions were provided over six weeks. The patient noted consistent pain relief and improved gait after thoracic manipulation. Girth measurements were reduced by 4 to 13 mm after the thrust manipulations. By the final session there was improved left ankle dorsiflexion and plantar flexion (15-0-60°) and strength (dorsiflexion of 4+/5 with all other directions being 5/5). Slump sit testing was negative. Outcome measures were: NPRS (no pain), Global Rating of Change (+6), and LEFS (73/80). She reported no symptoms or functional limitations with walking, stairs, or on uneven terrains. **Discussion - Conclusions:** Central sensitization was considered due to the positive slump test and thoracic irritation. Immediate relief of ankle pain from thoracic manipulation was likely due to reduced sympathetic excitation, allowing exercise-related interventions to be introduced earlier, expediting the rehabilitation process.

**KEYWORDS:** Ankle sprain, Thoracic spine manipulation, Thoracic spine mobilization.

Poster #25:

Abstract ID: 2781518

**ADVANCED CLINICAL REASONING FOR AN INDIVIDUAL PATIENT CASE WITH IMAGING EVIDENCE OF TRAUMATIC ACLAND MCL TEARS BUT CLINICAL PRESENTATION OF LUMBAR REFERRAL AND NEURAL INVOLVEMENT**

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**Background & Purpose:** Individuals may present to physical therapy (PT) with a predetermined diagnosis by another medical provider possibly introducing bias and a predetermined plan of care. However, utilization of an advanced clinical reasoning model assists in comprehensive hypothesis development and mitigation of these biases. The purpose of this case report is to describe the use of advanced clinical reasoning via the Maitland Concept and SCRIPT tool during skilled PT of an individual with imaging evidence of partial anterior/medial cruciate ligament (ACL/MCL) tears with conflicting clinical presentation. **Description:** A 34-year-old male, 12 days status post traumatic snowboarding accident, had left (L) mid lateral thigh pain radiating to the knee and across distal patella. Imaging was positive for a partial ACL/MCL tear. Initial evaluation findings were: multiple episodes of knee giving way/day, pain & limited function. He rated his pain as 5/10 pain at worst, 4/10 at best on the Numeric Pain Rating Scale (NPRS). The Lower Extremity Functional Scale (LEFS) was 19/80. Limited L knee range of motion (ROM): 3°-0°-105° was noted. He was unable to actively complete a straight leg raise (SLR). He demonstrated negative ligamentous/meniscal testing. Initial interventions aimed at restoring knee ROM and strength. The patient returned on second visit reporting no change. Utilization of the Maitland Concept revealed additional symptoms: low back pain wrapping around lateral hip into groin with reduced thoracic rotation and reproduction of symptoms with adduction/internal rotation SLR neural provocation. Treatment utilizing Grade III-IV mobilization and Grade V high velocity low amplitude thrust (HVLAT) to thoracolumar junction resulted in reduced in neural provocation upon SLR retesting. L knee flexion ROM improved to 130°. Gait normalized with adequate gluteal contraction. An orthopaedic manual PT approach including interventions of spinal mobilization with HVLAT, hip and patellar mobilizations, myofascial interventions, and therapeutic exercises were utilized over the next five sessions. **Outcomes:** After seven visits over five weeks, the LEFS improved by 56 points, NPRS decreased to 0/10. He had full knee ROM returned. He returned to running and high intensity workout activities symptom free. **Discussion - Conclusions:** This case report demonstrates that utilizing an advanced clinical reasoning framework helped to direct the successful management of a patient with imaging findings for ligamentous injury, but with proximal contribution.

**KEYWORDS:** CLINICAL REASONING, OMPT, Neural tension

POSTER #54:

Abstract ID: 2781533

**CORRELATING WEIGHT BEARING AND NON-WEIGHT BEARING OBJECTIVE FINDINGS TO ASCERTAIN AND TREAT PROXIMAL TIBIOFIBULAR JOINT ARTICULAR RESTRICTION: A CASE REPORT**  
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**Background & Purpose:** In literature, the proximal tibiofibular joint (PTFJ) is recognized as rarely injured. The purpose of this case report is to correlate weight bearing (WB) and non-weight bearing (NWB) tests to evaluate for PTFJ dysfunction. Root et al initially discussed ipsilateral supination and contralateral pronation of the feet with standing rotation. Pettman further describes an addition, the axial rotation test, which assesses the movement of the fibula in relation to the tibia. This test will be highlighted as a WB PTFJ screen, in addition to NWB joint mobility testing in supine, to direct initial treatment or referral. A talar swing test will also be utilized to evaluate mobility of the talocrural joint. **Description:** Two cases, a 30-year-old male with lateral knee pain and numbness along the peroneal nerve distribution and a 20-year-old female with a diagnosed lateral ankle sprain, presented to an outpatient clinic. Posteromedial and anterolateral articular restrictions at the PTFJ, respectively, were found during the axial rotation test and confirmed with supine PTFJ mobility testing. The talar swing test was positive in the affected lower leg in each case suggesting the inability of the talocrural joint to achieve conjunct external and internal rotation at end range dorsiflexion and plantarflexion respectively. **Outcomes:** A high-velocity low-amplitude thrust (HVLAT) manipulation was applied to the PTFJ to restore the lacking biomechanical glide specific to each case. The technique was performed in quadruped and supine, respectively, utilizing techniques not recognized in literature. Both subjects reported immediate symptom relief. Objectively, there was improvement in talocrural and PTFJ mobility as well as ankle range of motion. The axial rotation and talar swing tests were negative for hypomobility following the HVLAT manipulation, and further manual therapy was not indicated after the initial visit. Subsequently, the patients were able to return to previous level of function without residual effects at discharge. **Discussion - Conclusions:** Proper assessment of the PTFJ may help determine if manual therapy is indicated. The axial rotation test, and NWB joint mobility assessment, quickly and adequately evaluated the PTFJ. Alternative positioning of HVLAT manipulations to the PTFJ resulted in successful restoration of joint mobility indicating a potential alternate treatment approach. Further testing of the axial rotation and talar swing tests is necessary to determine clinical significance.

**KEYWORDS:** tibiofibular, test, Joint manipulation

Poster #47

Abstract ID: 2781684

**EFFECTIVENESS OF DRY NEEDLING WITHIN AN OMPT APPROACH FOR MYOFASCIAL TRIGGER POINTS IN HIPS FOLLOWING SEXUAL ASSAULT TRAUMA: A CASE REPORT**

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**Background & Purpose:** Sexual assault can cause psychological and physical health concerns requiring a multi-disciplinary therapy team as anxiety and depression and pelvic pain, low back pain (LBP), & trigger points (TPs) are common mental and physical health consequences. This case study describes the use of trigger point dry needling (TPDN) and orthopedic manual physical therapy (OMPT) techniques to address myofascial trigger point (MTrP) pain, that were coupled with counseling from a trauma psychologist. **Description:** A 28-year-old female, with a four-month history of myofascial pain syndrome in bilateral (B) anterior hips following a sexual assault, reported sharp pain in B anterior hip and thighs, tingling in both legs, and LBP, but no pelvic pain or pelvic trauma. Initial management by a trauma psychologist and an osteopath made minimal physical improvements. Upon examination, she presented with TP referral in B iliopsoas, rectus femoris/quadriceps, and gluteus medius. Strength inhibition, based on the in-session improvements demonstrated with manual muscle tested (MMT) strength following OMPT techniques, was noted with hip flexion and knee extension. She reported difficulty with walking and stair climbing. Initial outcome scores: Numeric Pain Rating Scale (NPRS): 4/10 and FOTO score 49. Pelvic health evaluation demonstrated no pelvic floor pain, trigger points, or dysfunction. Using an evidenced based and eclectic OMPT approach, she was treated for 14 visits over two months. TPDN was included to B iliopsoas, rectus femoris, quadriceps, and gluteal muscles. In-session improvements in MMT and functional strength following TPDN, as well as reduction in pain, were noted. Subsequent OMPT techniques included mobilization/manipulation to lumbar spine, soft tissue interventions to hip flexors, iliopsoas release, and kinesiotaping. Corrective exercises included core and hip strengthening, stretches, and postural strengthening exercises. Relaxation techniques and pain science education was coupled to compliment OMPT techniques. **Outcomes:** OMPT management, with psychological counseling, aided in the improved overall outcome. Management discontinued after 14 visits: NPRS was 0/10, FOTO score 70. She reported an absence of tingling and shooting pain in thighs. She was able to return to full activities including pain free sexual intimacy and intercourse. **Discussion - Conclusions:** This case report demonstrated the successful management using counseling and TPDN for a patient with myofascial pain syndrome status-post sexual assault. **KEYWORDS:** Dry Needling, Trigger Point, Hip

Platform #8

Abstract ID: 2781743 TITLE:

**A NOVEL TREATMENT TECHNIQUE TO IMPROVE LUMBAR FLEXION IN A PATIENT WITH LOW BACK AND LEG PAIN: A CASE REPORT**

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**Background & Purpose:** Low back pain (LBP) affects up to 80% of the population and is the most common diagnosis treated in physical therapy. Radiating pain frequently occurs with LBP. Despite clear definitions of spinally referred leg pain, radicular pain, and radiculopathy there is still diagnostic confusion, which leads to mismanagement. Furthermore, patients can have LBP and radiating pain, but the two can have separate but related mechanisms, thus requiring different treatment. The purpose of this case report was to describe a novel treatment technique used to improve lumbar flexion in a patient with LBP and leg pain developed based on the patient's separate but simultaneously occurring pain mechanisms. **Description:** A 20-year-old female presented with bilateral LBP described as deep, aching, and sharp with movement, pulling into posterior thighs, and vague numbness and tingling in both thighs. Pain began 10 days prior while stretching repeatedly into lumbar flexion. Sitting, bending, lifting, and driving aggravated her pain. Pertinent examination findings included: intact neurological examination, limited lumbar range of motion (ROM), and lumbar hypomobility assessed with passive accessory intervertebral movements (PAIVMs) and passive range of physiological movements of individual intervertebral joints (PPIVMs). LBP was reproduced with flexion and extension ROM, neurodynamic tests, PAVIMs, and PPIVMS. Leg pain was reproduced with flexion and neurodynamic tests. These findings suggested LBP originating from local somatic structures with peripheral neurogenic leg pain. Treatment included directional preference exercises, joint mobilization, neural mobilization (NM), and a novel technique: lumbar flexion passive physiological intervertebral motion at L4/5 in sidelying with a bilateral passive straight leg raise. **Outcomes:** After 4 visits, Focus on Therapeutic Outcomes (FOTO) score improved from 45/100 to 50/100. Oswestry Disability Index (ODI) score improved from 58% to 40%. Following 2 additional visits using the novel technique, more significant improvements: FOTO 50/100 and ODI: 11%. Furthermore, lumbar flexion ROM was full and pain free for the first time in the treatment episode. **Discussion - Conclusions:** This case report demonstrates the successful use of a novel treatment technique that simultaneously combined NM and joint mobilization in a patient with LBP and leg pain. It highlights the need to move toward a mechanism-based approach to diagnosis, which may lead to more appropriate sub-grouping and treatment.

**KEYWORDS:** low back pain, Neurodynamics, joint mobilization

Platform #: 41

ABSTRACT ID: 2781767

**THE IMPACT OF AN INDIVIDUALIZED PHYSICAL THERAPY TREATMENT PROGRAM FOR PATIENTS WITH HIP OSTEOARTHRITIS: A CASE SERIES**

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**Background & Purpose:** Osteoarthritis (OA) of the hip can lead to pain, reduced motion and an altered functional ability. These limitations can considerably affect an individual's quality of life. Several studies have shown efficacy for the provision of physical therapy (PT) for those with hip OA. However many of these studies have used standardized treatment approaches. The purpose of this case series was to evaluate the effectiveness of individualized PT program using manual therapy and exercise for patients with hip OA. **Description:** Four participants with a median age of 61 years (range 38-71) diagnosed with hip OA underwent a detailed history, physical examination, and the following physical performance and self-report measures: the Harris Hip Questionnaire (HHQ), Lower Extremity Functional Scale (LEFS), Timed Up-and-Go (TUG), 30 Second Sit-To- Stand (30 STS), 40m Fast Paced Walk Test (40m FPWT). Each participant underwent a median of 7 visits (range of 7 to 8 visits) of a combined approach of manual therapy of thrust and non-thrust manipulation with therapeutic exercise to address range of motion and strength deficits. After four weeks, the participants were reassessed using the same outcome measures. **Outcomes:** Following therapy, three of the four participants showed an improvement in the LEFS with a median change in median score 7.5 with two demonstrating a change of 10 or greater. All participants demonstrated an increase with the HHQ with a median change of 10. Three out of the four participants showed a decrease in pain with a median change of -1.5. There was an improvement with walking speed with the 40m FPWT in two of the four participants though the median showed a decrease in speed of -0.025 m/sec (range of -0.19 to 0.11). Improvement with the number of STS completed in 30 seconds was demonstrated by three of four of the participants with median of 2. With the TUG, 1 participant stayed at the same time while the other 3 decreased their time; the median here was - 1.425 sec. **Discussion - Conclusions:** All participants showed improvements in one or more of the measures with two of the four participants showing an improvement in all measures following an individualized program of manual therapy and exercise. Therefore it should be considered that the combined therapeutic approach of exercise and manual therapy can provided positive outcomes with reduced pain and increased function.

KEYWORDS: MANUAL, functional, outcome

Poster #51:

Abstract ID: 2782518

**MANAGEMENT OF CHRONIC CARPAL TUNNEL SYNDROME AND WIDESPREAD MECHANICAL PAIN SENSITIVITY USING NOXIOUS MANUAL THERAPY AT THE THORACIC SPINE: A CASE REPORT**

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**Background & Purpose:** Carpal tunnel syndrome (CTS) is the most commonly diagnosed nerve compression disorder of the upper extremity. Despite its assumed peripheral origin, it commonly presents with both peripheral and central pain mechanisms making management challenging. Management is often focused at the wrist without consideration of spinal contributions. The purpose of this case report was to describe the successful management of an individual with apparent CTS through interventions directed at the thoracic spine. **Description:** A 34-year-old female presented with a three year history of right hand pain, numbness and coldness. Her pain began during pregnancy and progressively worsened, reaching up to 10/10 on the Numeric Pain Rating Scale. Electrodiagnostic testing indicated slowed conduction of the median nerve at the wrist. Wrist examination was normal and symmetrical throughout. However, examination of her thoracic spine was limited secondary to mechanical hyperalgesia throughout the paraspinal and periscapular soft tissue. Pressure pain thresholds (PPT) at her ipsilateral first dorsal interosseous muscle, lateral epicondyle, and lateral malleolus, were significantly below reported normative values. Considering central sensitization as a primary pain driver, noxious cupping was performed bilaterally at the thoracic spine to promote pain inhibition. By the fourth visit, her soft tissue hyperalgesia resolved. Cervical and thoracic hypomobility was treated with thrust manipulations with no appreciable effect on symptoms. On visit seven, unilateral posterior-to-anterior testing at the third thoracic segment reproduced her hand pain. Grade IV++ unilateral mobilizations were performed and resolved the patient's complaints in three sessions. **Outcomes:** The patient was seen for a total of 10 visits. Her pain, numbness, and coldness had resolved and PPT values normalized. Her disability, measured by the QuickDASH, had improved from 61.4 to 4.5. **Discussion - Conclusions:** This case report describes the clinical reasoning behind the use of manual therapy at the thoracic spine to address potential central and peripheral pain mechanisms in a patient with chronic CTS. While CTS is believed to be due to constriction of the median nerve in the carpal tunnel, the client's impairments resolved with treatment directed at the thoracic spine. Clinicians may wish to examine proximal and/or central regions to determine if those regions are contributing to symptoms in patients diagnosed with CTS.

**KEYWORDS:** Carpal Tunnel, quantitative sensory testing, central sensitization

Platform 35

Abstract ID: 2816299

**BASELINE PAIN SCORES PREDICT PAIN IMPROVEMENT AFTER THORACIC SPINE MANIPULATION IN PATIENTS WITH SHOULDER PAIN**

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**Background & Purpose:** Thoracic spine manipulation (TSM) has been used for shoulder pain treatment. A previous randomized controlled trial (RCT) previously demonstrated shoulder pain improvements after one or two TSM sessions despite any scapular kinematic or function change. The aim of this study was to perform a secondary analysis from a RCT dataset to determine possible baseline variables associated with pain improvement and that might predict improvement following TSM. **Methods:** Twenty-nine patients with shoulder pain received 2 sessions of TSM intervention within a one week period. Patients & assessors were blinded to group assignment. Baseline demographic and clinical data were age, gender, pain duration, shoulder function, and three-dimensional scapular kinematics during arm elevation (scapular upward and internal rotation and tilt measured with Flock of Birds integrated with Motion Monitor software). Pain intensity on the Numeric Pain Rating Scale (NPRS) during arm elevation was measured at baseline and after intervention. Normality distribution was verified by Shapiro-Wilk test. Pearson & Spearman correlations tests verified associations between age, gender, pain duration, baseline NPRS, and scapular kinematics with NPRS change. The presence of multicollinearity was checked for independent variable selection. A multivariable regression model was created with those independent variables that demonstrated at least a moderate statistically significant correlation with the dependent variable NPRS change. **Results:** There was no correlation between age, gender, pain duration, shoulder function, scapular upward rotation or tilt at baseline with NPRS change. Scapular internal rotation and pain intensity at baseline were moderately correlated with NPRS change. The model as a whole explained 42.8% of the NPRS change variance ( $R^2 = 0.42$ ;  $F(2, 23) = 8.60$ ;  $p = 0.002$ ) and only baseline NPRS made a statistically significant contribution to the model explaining 30% of the NPRS change variance ( $b = -0.56$ ,  $p = 0.002$ ). **Discussion - Conclusions:** Demographics and kinematics variables did not significantly contribute to pain improvement following TSM intervention. Baseline NPRS was the best predictor to pain improvement since the greater baseline NPRS, the greater pain improvement. This suggests neurophysiological TSM effects associated with higher pain levels at baseline are related to better pain outcomes in patients with shoulder pain. Further studies are needed to identify additional mechanisms involved with patient improvement following TSM.

**KEYWORDS:** Thoracic Manipulation, Pain, kinematics

Poster #48:

Abstract ID: 2781293

## **THE EFFECTS OF MANUAL THERAPY FOR TMJ DYSFUNCTION FOLLOWING A GUNSHOT WOUND TO THE FACE: A CASE REPORT**

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**Background & Purpose:** Fractures of facial bones in the United States are not common. Studies of facial fractures in the United States reveal an altered pattern of etiology attributed to the cultural, social, and environmental changes. The trend is away from the motor vehicle accidents and towards interpersonal violence. It became the leading cause of facial fractures, particularly in urban areas. Post-operative management of open reduction, internal-fixation (ORIF) of the zygoma and surrounding bones is very rare in physical therapy clinical practice. Potential consequences of this type injury can include diplopia, infraorbital nerve dysfunction, trismus and temporomandibular joint (TMJ) dysfunction. The purpose of this single case report is to describe the effects of manual physical therapy and therapeutic exercises on a patient with a right-sided ORIF of zygomaticomaxillary complex (ZMC) resulting from a gunshot injury. **Description:** The patient was treated for a total of six visits with interventions consisting of soft tissue and joint mobilization directed at the right TMJ, the masseter and medial pterygoid muscles. Also, therapeutic exercises addressed neuromuscular re-education of the muscles of mastication. The patient was given a home program of self-stretching exercises and postural education. **Outcomes:** At discharge, the patient exhibited 33 millimeter (mm) of incisal opening (20 mm of improvement) and TMJ Disability Questionnaire of 5/40 (16 points of improvement). The Numeric Pain Rating Scale improved from 8/10 to 0/10. In addition, the patient self-reported 100% functional improvement, with no wish for future surgical intervention. **Discussion - Conclusions:** This case report described the manual therapy and therapeutic exercise for TMJ dysfunction following trauma.

**KEYWORDS:** Education, Student Experiences, Student Physical Therapist.