AAOMPT Conference 2015
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Abstracts Selected for Platform Presentations

CONTROL ID: 2314756
TITLE: USING FMRI TO DETERMINE IF CEREBRAL HEMODYNAMIC RESPONSES TO PAIN CHANGE FOLLOWING THORACIC MANIPULATION IN INDIVIDUALS WITH NECK PAIN

AUTHORS (LAST NAME, FIRST NAME): Sparks, Cheryl L.; Cleland, Josh; Elliott, James; Kelly, Joseph; Fuller, Sarah; Garber, Kathryn; Zagardo, Michael; Liu, Wen-Ching

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ABSTRACT BODY:

Background & Purpose: Previous research utilizing functional magnetic resonance imaging (fMRI) in healthy individuals has identified changes in supraspinal activity in response to noxious mechanical stimuli following thrust manipulation (TM) to the thoracic spine. It is unknown how this response may differ in individuals with neck pain and if it varies from a sham comparator. The purpose of this study was to examine how supraspinal activation in response to noxious mechanical stimuli, delivered to two distinct locations, varies with TM to the thoracic spine when compared to sham manipulation (SM) as measured by use Blood Oxygenation Level Dependent (BOLD) fMRI.

Methods: Twenty-four volunteers with complaints of acute or sub-acute mechanical neck pain satisfied eligibility requirements and agreed to participate. Participants were randomized to receive either TM to thoracic spine or SM. Following baseline examination, participants underwent fMRI scanning while receiving noxious stimuli directed to the cuticle of the index finger at a rate of 1 Hertz for 15 seconds, followed by 15 seconds of rest for a period of five minutes. This process was then repeated at the great toe. Based on assignment, participants received either a supine TM or SM to the midthoracic spine, and immediately underwent re-imaging with a second delivery of noxious stimuli to the index
finger and great toe. An 11-point Numeric Pain Rating Scale (NPRS) was administered for neck pain and at each session, pre and post, to determine perceptions of pain intensity with respect to the index finger and the great toe. BOLD fMRI recorded the cerebral hemodynamic response to the mechanical stimulus.

**Results:** Imaging revealed significant group by time differences with a 35% decrease in the voxelwise hemodynamic response for those receiving TM (p < .05), whereas those receiving SM demonstrated an increase in BOLD activity by 11% (p < .05). Self-reported neck pain decreased in the manipulation group and increased in those receiving the sham intervention, however these differences were not significant (p = .07). Group by time differences were not significant on the NPRS for the hand (p = .65) or the foot (p = .64), as both groups reported a reduction in stimulus intensity.

**Discussion - Conclusions:** This study provides evidence supporting supraspinal mechanisms, in response to noxious mechanical stimuli, vary between TM and a sham comparator, offering additional insight to the scientific underpinnings associated with the clinical effects of manipulation.

**KEYWORDS:** manipulation, neuroscience, fMRI.
Methods: Electromyography (EMG) data were collected using Delsys EMGworks® software and Trigno® mini-wireless surface electrodes for the supraspinatus, infraspinatus and upper trapezius musculature during grade III GH distraction and posterior glide mobilization. A total of 20 shoulders (10 painful, 10 non-painful) were recruited from a sample of convenience. Submaximal voluntary dynamic contraction (VDC) against gravity was used as a reference for each of the three selected muscles. Participants underwent two trials of each mobilization, and the root mean squared (RMS) was obtained for each muscle. The mean results for each group were assessed using descriptive statistics (mean, standard deviation) and effect size.

Results: Both the painful and non-painful groups exhibited considerable levels of rotator cuff activity during each test parameter, with the painful group consistently generating higher supraspinatus and infraspinatus RMS and peak force activity. Analysis of the peak combined rotator cuff activity during distraction mobilization (control 75.40±30.04, painful 107.07±71.07, d=0.58), and posterior glides (control 70.41±31.52, painful 99.52±55.87, d=0.64) suggest moderate to high practical significance of the results.

Discussion - Conclusions: GH distraction and posterior glide mobilizations have traditionally been thought of as passive treatment procedures. The results of this pilot study indicate that the supraspinatus and infraspinatus of both painful and non-painful shoulders are significantly active during these techniques. The painful shoulders exhibited consistently greater amounts of activity when compared to non-painful shoulders. The findings suggest that, during these techniques, the total infra/supraspinatus EMG activity approaches the level produced while raising the arm against gravity. Clinically, these findings may need to be considered when selecting an appropriate time to administer these techniques in post-operative patients.

KEYWORDS: mobilization, EMG, rotator cuff

CONTROL ID: 2330833
TITLE: A PRESCRIPTIVELY PRESCRIBED NON-THRUST MANIPULATION VERSUS A PRAGMATICALLY PRESCRIBED NON-THRUST MANIPULATION FOR TREATMENT OF LOW BACK PAIN: A RANDOMIZED CONTROLLED TRIAL
AUTHORS (LAST NAME, FIRST NAME): Cook, Chad¹; Donaldson, Megan B.³; Learman, Kenneth²
AUTHORS/INSTITUTIONS: C. Cook, Orthopedics, Duke University, Durham, North Carolina, UNITED STATES; K. Learman, PT, Youngstown State, Youngstown, Ohio, UNITED STATES;
ABSTRACT BODY:

Background & Purpose: Many manual therapists adopt the principle of specificity; a theory which implies that mechanical forces applied to specific vertebral regions may lead to significant biomechanical changes. This theory has not been supported in immediate effects-based studies. It is well documented that immediate effects are not directly associated with long-term functional or disability improvements for patients with neck, low back, shoulder, and hip pain. Consequently, the purpose of this study was to examine the 6-month differences in pain, disability, acceptance state and well-being between a pragmatically-applied (localized) non-thrust manipulation versus a prescriptively applied, (non-localized) non-thrust manipulation in subjects with mechanical low back pain.

Methods: The study was an RCT with two treatment arms. For inclusion, individuals had to have mechanically producible LBP, a minimum Modified Oswestry Disability Index (ODI) score of 20% and a baseline pain score of >2.0/10. All non-thrust manipulative procedures (whether prescriptive or pragmatic) were performed by one of 4 skilled manual therapy clinicians who were fellows in manual therapy from AAOMPT. All subjects in both treatment groups received a standardized home exercise program with standardized instructions. Pain, ODI, GRoC and patient acceptable symptoms state (PASS) scores were captured as outcomes measures. An ANCOVA and a Chi square were used to determine differences between groups.

Results: 63 subjects were enrolled in the trial and tracked for 6 months and both groups significantly improved (within groups). There were no differences in baseline characteristics between the two groups for study (p>0.05) and no differences between groups in pain, disability, or PASS scores at 6 months. There was a significant difference in GRoC scores favoring the pragmatically applied mobilization group at 6 months.

Discussion - Conclusions: This study is the first to measure long-term differences between a prescriptively applied versus a pragmatically applied non-thrust manipulation. In pain, disability and PASS there were no differences in outcomes, a finding that is reflective of immediate effects studies. An interesting finding is that at 6 months, those in the pragmatic non-thrust manipulation groups’ perceived well-being was significantly higher. Future studies should be powered to allow sub-analysis for exceptional responders to various forms of non-thrust manipulation.

KEYWORDS: Mobilization, Outcomes, Low Back Pain.
Background & Purpose: Previous studies have investigated the mechanical and neurophysiologic effects of thoracic spine manipulation. More recently, studies have attempted to quantify manipulative effects on the autonomic nervous system. Results indicate that a systemic neurophysiologic effect may be the mechanism for pain reduction, central and peripheral range of motion (ROM) and strength alterations, as well as pain-pressure threshold improvements. No previous studies have investigated the effects of thoracic spine manipulation on peripheral neurodynamic mobility in the upper and lower quarter. This study investigated the immediate effects of thoracic spine manipulation on the Upper Limb Tension Test (ULTT) and Seated Slump Test (SST) in asymptomatic subjects who presented with neurodynamic mobility limitations.

Methods: Eighty-one adults who met inclusion criteria were tested for the presence of neurodynamic limitation via the ULTT and SST. Neurodynamic testing was completed bilaterally on all subjects in random order. Those who met previously published ROM limitations not considered a false positive (n=57) for at least one of the four limbs measured received a supine thoracic spine manipulative technique with attempted localization between the T4-T7 segments. Neurodynamic mobility was reassessed after manipulation according to pretest procedures. A single-blinded, single-group, pretest-posttest design was utilized.

Results: Fifty-seven subjects (5 ULTT, 18 SST, 34 both ULTT and SST) demonstrated positive neurodynamic testing and received a thoracic spine manipulation. Statistical significance was noted for SST (Z=-3.91, p < .001) and for those positive in both ULTT and SST (Z=-8.79, p < .001) but not for those positive solely in ULTT (Z=-1.82, p=0.69). Mean improvements were ULTT 28° (95% CI -3.19-59.19) and SST 9.03° (95% CI 5.37-12.69).

Discussion - Conclusions: Our findings suggest that thoracic spine manipulation influences neurodynamic mobility in asymptomatic subjects. Upper quarter neurodynamic mobility improved more than lower quarter, possibly due to the
location of the manipulation between the T4-T7 segments. Subjects who responded most favorably presented with greater ROM limitations or positive neurodynamic testing in multiple limbs. Consequently, our findings indicate a peripheral neurophysiologic and systemic effect following manipulation. These findings may have clinical relevance when treating patients with irritable neurogenic upper or lower quarter symptoms, which may preclude direct treatment techniques.

**KEYWORDS:** Manipulation, Thoracic, Neurodynamics.

**CONTROL ID:** 2319138
**TITLE:** UPPER CERVICAL AND UPPER THORACIC THRUST MANIPULATION VERSUS NON-THRUST MOBILIZATION AND EXERCISE IN PATIENTS WITH CERVICOGENIC HEADACHE: A MULTI-CENTER RANDOMIZED CLINICAL TRIAL
**AUTHORS (LAST NAME, FIRST NAME):** Dunning, James¹; Butts, Raymond²; Mourad, Firas³; Young, Ian A.⁴; Fernandez-de-las Peñas, Cesar³; Hagins, Marshall⁵; Stanislawski, Thomas ⁶; Don, Jonathan²; Buck, Dustin¹; Hooks, Todd⁸; Cleland, Josh⁹
**AUTHORS/INSTITUTIONS:** J. Dunning, Alabama Physical Therapy & Acupuncture, Montgomery, Alabama, UNITED STATES; R. Butts, J. Don, Research Physical Therapy Specialists, Columbia, South Carolina, UNITED STATES; F. Mourad, C. Fernandez-de-las Peñas, Universidad Rey Juan Carlos, Alcorcón, SPAIN; I.A. Young, Spine & Sport, Savannah, Georgia, UNITED STATES; M. Hagins, Long Island University, Brooklyn, New York, UNITED STATES; T. Stanislawski, Back to Health, Brooklyn, New York, UNITED STATES; D. Buck, Cutting Edge Orthopedics, Gilbert, Arizona, UNITED STATES; T. Hooks, Champion Sports Medicine, Birmingham, Alabama, UNITED STATES; J. Cleland, Franklin Pierce University, Manchester, New Hampshire, UNITED STATES;

**ABSTRACT BODY:**
**Background & Purpose:** Although commonly utilized interventions, no studies have directly compared the effectiveness of cervical and thoracic high-velocity low-amplitude (HVLA) thrust manipulation to non-thrust mobilization and exercise in individuals with cervicogenic headache.

**Methods:** One hundred and ten participants (n=110) with cervicogenic headache were randomized to receive both
cervical and thoracic HVLA thrust manipulation (n=58) or non-thrust mobilization and exercise (n=52). The primary outcome was headache intensity as measured by the Numeric Pain Rating Scale (NPRS). Secondary outcomes included headache frequency and duration, disability as measured by the Neck Disability Index, medication intake, and the Global Rating of Change (GRC). The treatment period was 4 weeks with follow-up assessment at 1 week, 4 weeks, and 3 months after initial treatment session. The primary aim was examined with a 2-way mixed-model analysis of variance (ANOVA), with treatment group (HVLA thrust manipulation versus non-thrust mobilization and exercise) as the between subjects variable and time (baseline, 1 week, 4 weeks and 3 months) as the within subjects variable.

**Results:** The 2X4 ANOVA demonstrated that individuals with cervicogenic headache who received both cervical and thoracic HVLA thrust manipulation experienced significantly greater reductions in headache intensity (F = 11.196; p < 0.001), disability (F = 8.57; p < 0.001) and headache frequency (F = 9.47; p < 0.001) than those who received non-thrust mobilization and exercise at a 3-month follow-up. Patients receiving HVLA thrust manipulation were 4 times more likely than patients receiving non-thrust mobilization and exercise to have completely stopped taking all medications for their headaches at 3 months (odds ratio = 3.96 [95% CI: 1.8, 8.9]; p = 0.0009). Based on the cutoff score of +4 or better on the GRC, significantly (X² = 15.34; p < 0.001) more patients in the HVLA thrust manipulation group (n = 52, 89.7%) achieved a successful outcome compared to the non-thrust mobilization and exercise group (n = 19, 36.5%). Effect sizes were large (Cohen’s d > 0.8) for all outcome measures in favor of the HVLA thrust manipulation group.

**Discussion - Conclusions:** Six to eight sessions of upper cervical and upper thoracic HVLA thrust manipulation were shown to be appreciably more effective than non-thrust mobilization and exercise in patients with cervicogenic headache, and the effects were maintained at 3 months.

**KEYWORDS:** Cervicogenic Headache, Spinal Manipulation, Mobilization.

**CONTROL ID:** 2314949
**TITLE:** CLINICAL SPECIALISTS ABILITY TO RECOGNIZE CLINICAL PATTERNS IN VIRTUAL PATIENTS WITH LOW BACK PAIN
**AUTHORS (LAST NAME, FIRST NAME):** Ladeira, Carlos
**AUTHORS/INSTITUTIONS:** C. Ladeira, Physical Therapy, Nova Southeastern University, Coral Springs, Florida, UNITED STATES;
ABSTRACT BODY:

Background & Purpose: The APTA guidelines for management of low back pain (LBP) recommends that physical therapists (PTs) use treatment-based classification subgroups (TBCS). The author wanted to show that clinical specialization (Fellowship in Orthopedic Manual Therapy [FOMT] and/or Orthopedic Clinical Specialization [OCS]) improved clinical pattern recognition of TBCS. The purpose of the study was to determine the ability of PTs with different clinical specializations to recognize clinical patterns in patients presenting with LBP (manipulation, specific exercises, stabilization exercises, or fear avoidance behavior [FAB]).

Methods: Emails were sent to 3000 PTs (1000 AAOMPT members, 2000 members of the APTA musculoskeletal interest group). Participants were asked to make treatment choices based on hypothetical clinical vignettes as has been done in prior studies. The patient clinical vignettes met four distinct TBCS as described in the guideline of the APTA's Orthopedic Section: spine manipulation, specific exercise (directional preference), stabilization exercise, and FAB scenarios. Three content experts validated the vignettes. Chi-square was used to compare recognition of clinical patterns among therapists with different clinical specializations.

Results: 343 PTs participated in the survey: 89 PTs with OCS & FOMT (PTFOs), 125 PTs with an OCS (PTOs), 66 PTs with FOMT (PTFs), and 63 PTs without specialization (PTMS). In general, PTs with specialization recognized clinical patterns better than PTs without specialization. For the manipulation group, PTFOs did better than PTMS (p=0.006). For the specific exercise group, PTFOs did better than the PTFs (p=0.001) and PTMS (p=0.001); PTOs did better than PTFs (p=0.001) and PTMS (p=0.009). For the stabilization group, PTFOs did better than PTOs (p=0.014), PTFs (p=0.001) and PTMS (p=0.001). For the FAB group, PTFOs did better than PTMS (p=0.001) and PTFs (p=0.002); PTOs did better than PTMS (p=0.001) and PTFs (p=0.008).

Discussion - Conclusions: Overall, the results of the study showed that clinical specialization has a positive effect in the recognition of TBCS of patients with LBP. This means that therapists with specialization were better prepared to manage patients with LBP than their peers. However, PTFs did not seem to be better prepared than their peers without specialization to recognize patients in any of the TBCS investigated. This latter finding needs further investigation.

KEYWORDS: Evidence Based Practice, Clinical Specialization, Low Back Pain.
Background & Purpose: To date, no randomized controlled trials have evaluated the benefit of adding exercise and manual therapy directed at the hip in patients with low back pain (LBP). The purpose of this study is to determine whether a formal prescriptive treatment protocol for the hips improved outcomes in patients with a primary complaint of LBP.

Methods: Thirty subjects (15 males and 15 females, 47±14 years) were randomized to one of two groups: pragmatic treatment of the lumbar spine only (n=13) or pragmatic treatment of the lumbar spine and prescriptive treatment of bilateral hips (n=17). Pragmatic treatment of the lumbar spine consisted of any techniques the treating therapist thought was appropriate for the management of the subject’s LBP except hip exercise and mobilization. However, core stabilization exercises that involve hip musculature were allowed. Prescriptive treatment of the hips involved the instruction in a home exercise program (2x/day, 12-15 reps bilaterally) consisting of: 1) clam abduction exercises in side lying, 2) hip extension in quadruped and 3) a unilateral bridge. Additionally, subjects were treated with a least one bout of 30 seconds of each of the following mobilization techniques to each hip: 1) anterior-to-posterior mobilization of the hip with distraction, 2) long axis distraction of the hip and 3) posterior-to-anterior mobilization of the hip in prone. The treating therapist was allowed to determine treatment frequency and duration. Subjects were assessed at baseline, 2 weeks, and at discharge with the following measures: Oswestry Disability Index (ODI), Numeric Pain Rating Scale (NPRS), a Global Rating of Change (GRoC) score, and the Patient Acceptable Symptom State (PASS).

Results: Mann Whitney U analyses found no differences in ODI or NPRS percent change (p=0.56 and p=0.52, respectively) between groups. Both groups exhibited 63.4- 67.3% improvements in ODI from baseline, whereas the NPRS decreased by 68.4-75.0% from baseline. No differences in GRoC scores were present (p=0.89) with both groups reporting a median discharge score of +5. Fisher exact analyses found no differences in PASS scores for either group.
with 88% of individuals reporting an acceptable state at discharge (p=1.0).

**Discussion - Conclusions:** Preliminary data indicate that both groups experienced notable improvements in all outcomes scores. However, a larger sample size is needed to conclusively determine if clinically meaningful differences between groups are present.

**KEYWORDS:** Hip, Manual Therapy, Exercise.

**CONTROL ID:** 2317385

**TITLE:** EFFICACY OF A GENERAL LUMBAR STABILIZATION/STRENGTHENING EXERCISE PROGRAM VERSUS LUMBAR STABILIZATION/MOTOR CONTROL IN YOUTH ATHLETES WITH SPONDYLOLISTHESIS: A RANDOMIZED CLINICAL TRIAL.

**AUTHORS/INSTITUTIONS:** M.B. Donaldson, L. Willis, A. Lawver, Physical therapy, Walsh University, North Canton, Ohio, UNITED STATES;

**ABSTRACT BODY:**

**Background & Purpose:** A review of the current literature shows that there is a lack of consensus regarding the treatment of spondylolisthesis in children and adolescents. Most of the views and recommendations provided in various reports are weakly supported by evidence. The purpose of this study was to examine the effectiveness in treatment outcomes and adherence of the adolescent athlete diagnosed with spondylolisthesis after undergoing a general lumbar stabilization/strengthening program versus a lumbar stabilization/motor control program.

**Methods:** This was a single site randomized, controlled trial. (ClinicalTrials.gov: NCT01750736) The setting was an Orthopedic Sports Medicine department and PT clinic. Non-surgical adolescent aged 8-18 year old patients with confirmed imaging of spondylolisthesis due to sports participation were included. The intervention was a specific lumbar stabilization with motor control utilizing specific verbal cuing, use of biofeedback unit, manual feedback, and emphasized medical Pilates based exercises. General lumbar stabilization and strengthening program of the lumbar stabilizers and core musculature, cueing for form only. Primary outcomes included modified Oswestry Disability Index (ODI), Numeric Pain Rating Scale (NPRS), and Global Rating of Change score (GROC).

**Results:** A total of 25 patients aged 8-18 years old (and their guardians) gave informed consent for participation
during October 2012 through September 2014. Patients were randomly assigned to two different treatment groups for six weeks. There was no statistical significance between the intervention and control group for pain on NPRS (p=0.62), disability on the ODI (p=0.40), or perceived improvement on the GROC (p=0.45). There was a small effect size favoring the intervention versus the control group for both NPRS (0.20) and ODI (0.37). There was a statistically significant relationship found between return to play/activity and both self-report home exercise adherence (p=0.002) and the minimal clinically important difference change in GROC, above a 5-point change in score (p=0.048).

**Discussion - Conclusions:** Both types of stabilization exercises interventions appear to be effective in reducing pain and disability with a greater effect size favoring the motor control interventions. Although this study is a small sample of a unique population, it is recognized that adolescent spinal pain is different from that of adult chronic pain or clinical trials and a direct comparison may be difficult.

**KEYWORDS:** low back pain, motor control, adolescents.

**CONTROL ID:** 2326061
**TITLE:** EFFECT OF CERVICOThorACIAL JUNCTION THRUST MANIPULATION VERSUS UPPER CERVICAL AND UPPER THORACIC THRUST MANIPULATION ON PAIN, DISABILITY AND BLOOD FLOW IN PATIENTS WITH UPPER TRAPEZIUS MYALGIA

**AUTHORS (LAST NAME, FIRST NAME):** Mourad, Firas¹; Dunning, James²; Rosa, Riccardo ³; Bonetti, Francesca ⁴; Pece, Andrea⁵; Butts, Raymond⁶; Fernández de las Peñas, César¹

**AUTHORS/INSTITUTIONS:** F. Mourad, C. Fernández de las Peñas, Ciencias de la Salud, Universidad Rey Juan Carlos, Madrid, SPAIN; J. Dunning, Alabama Physical Therapy & Acupuncture, Montgomery, Alabama, UNITED STATES; R. Rosa, Centro Cefalee Dip. Med. Clinica Policlinico Umberto I, Rome, ITALY; F. Bonetti, A. Pece, Università Tor Vergata, Rome, ITALY; R. Butts, Research Physical Therapy Specialists,, Columbia, South Carolina, UNITED STATES

**ABSTRACT BODY:**
**Background & Purpose:** To date, no studies have investigated whether high-velocity low amplitude (HVLA) thrust manipulation to the cervicothoracic spine can deactivate painful trigger points in the upper trapezius. Therefore, the purpose of this study was to compare the short-term neurophysiological effects of two different HVLA thrust
manipulation techniques, targeting either the cervicothoracic junction or the upper cervical and upper thoracic spines, in patients with upper trapezius myalgia.

**Methods:** Thirty-three patients with a primary complaint of upper trapezius myalgia were allocated to receive a single session of either cervicothoracic junction HVLA thrust manipulation in prone (n=18) or upper cervical and upper thoracic HVLA thrust manipulation in supine (n=15). The primary outcome measure was the patient’s perceived level of disability as measured by the Neck Disability Index (NDI). Secondary outcome measures included the Numeric Pain Rating Scale (NPRS), Pressure Pain Thresholds (PPT), and blood flow & oxygenation as measured by the combination of White Light Spectroscopy and Laser Doppler Flowmetry. All outcome measures were taken at baseline and 48-hours following treatment.

**Results:** The prone cervicothoracic HVLA thrust manipulation group experienced a 62.8% (CI: 48.4, 77.2) mean reduction in disability; likewise, the supine upper cervical and upper thoracic HVLA thrust manipulation group experienced a 64.2% (CI: 49.4, 78.9) mean reduction in disability. The prone manipulation group experienced a 61.3% (CI: 41.3, 81.2) mean reduction in neck pain compared to a 71.3% (CI: 51.4, 91.2) reduction for the supine manipulation group. The prone manipulation group experienced a 44.9% (CI: 29.9, 59.8) mean increase in PPTs compared to a 38.0% (CI: 14.0, 61.9) mean increase in the supine manipulation group. Notably, both HVLA thrust techniques were found to be equally effective at reducing disability (p = 0.211) and neck pain (p = 0.749), and at increasing pressure pain thresholds (p = 0.665). There was no significant difference in blood flow (F = 1.270, p = .329) or oxygen saturation (F = .677, p = .583) over active trigger points between baseline and immediately after treatment.

**Discussion - Conclusions:** The delivery of HVLA thrust manipulation to either the cervicothoracic junction (C7-T3) in prone, or the upper cervical (C1-2) and upper thoracic (T1-3) spines in supine, is equally effective in the short-term in patients with a primary complaint of upper trapezius myalgia.

**KEYWORDS:** Spinal Manipulation, Cervicothoracic, Trigger Point.

**CONTROL ID:** 2316704  
**TITLE:** DRY NEEDLING FOR PLANTAR HEEL PAIN: A CASE SERIES  
**AUTHORS (LAST NAME, FIRST NAME):** Baker, Sarah¹; Koppenhaver, Shane ²; Young, Brian ²; Allen, Christopher ²

ABSTRACT BODY:

Background & Purpose: There is limited evidence to support the use of dry needling (DN) in patients with plantar heel pain (PHP). The purpose of this study was to prospectively observe the short-term outcomes of treating patients with PHP with DN and stretching exercises.

Methods: Patients with PHP received two DN treatments per week for two weeks and stretching exercises directed at the foot and leg muscles. Patients continued a tailored home exercise program for an additional three months. Patient self-reported outcome measures and ankle dorsiflexion range of motion (ROM) were collected at baseline, 1, 2, 6, and 14 weeks.

Results: Seventeen patients (15 males, mean age ± SD, 39 ± 11 years) with symptoms ranging from four days to ten years (mean duration 1.6 ± 2.8 years) were enrolled. Significant and clinically meaningful improvements were observed in the Foot and Ankle Ability Measure ($P = .010, .004, .003$) at 2, 6, and 14 weeks, respectively, and Numeric Pain Rating Scale scores ($P = .013, .001, .026, .012$) at all time points. The percentage of patients that reported clinically meaningful improvement via global rating of change scores ranged from 69%, 81%, 73%, and 64% at 1, 2, 6, and 14 weeks, respectively. There were no significant changes in ROM ($P = .911$).

Discussion - Conclusions: Patients with PHP treated with DN and stretching exercises demonstrated statistically significant and clinically meaningful short-term improvements in self-reported pain and function. Further research is necessary to determine the effectiveness of DN combined with stretching for patients with PHP.

KEYWORDS: Plantar Fasciitis, trigger point dry needling (TDN).
Authors (last name, first name): Mischke, John J.; Jayaseelan, Dhinu J.; Sault, Josiah D.; Emerson-Kavchak, Alicia


Abstract Body:

Background & Purpose: Plantar heel pain is common and can be severely disabling. Unfortunately, a gap in the literature discerning the optimal treatment for plantar heel pain still exists. Consequently, a systematic review of the current literature regarding manual therapy for the treatment of plantar heel pain was performed.

Methods: A computer-assisted literature search for randomized controlled trials in MEDLINE, EMBASE, Cochrane, CINAHL, and Rehabilitation & Sports Medicine Source, was concluded on 7/1/2014. After identification of titles, three independent reviewers selected abstracts and then full text articles for review.

Results: Eight articles were selected for the final review and underwent PEDro scale assessment for quality. Heterogeneity of the articles did not allow for quantitative analysis. Only two studies scored ≥7/10 on the PEDro scale and included joint, soft tissue, and neural mobilization techniques. These two studies showed statistically greater symptomatic and functional outcomes in the manual therapy group.

Discussion - Conclusions: This review suggests manual therapy is effective in the treatment of plantar heel pain; however, further research is needed to validate these claims given the preponderance of low quality studies.

Keywords: Heel pain, Manual Therapy, Systematic Review.
BACKGROUND & PURPOSE: Expectations tied to physical therapy interventions may shape individual clinical outcomes, and experiences, for patients with neck pain. Patterns of neural activation may also demonstrate changes based on whether or not the patient has an expectation of benefit with manipulation, and receives that intervention. The purpose of this study was to examine the extent to which patient expectations associated with manipulation modulated pain ratings and signal changes using Blood Oxygenation Level Dependent (BOLD) functional magnetic resonance imaging (fMRI).

METHODS: We performed a secondary analysis of data from a randomized trial. Twenty-four subjects with complaints of mechanical neck pain were queried on their perception of benefit from manipulation prior to receiving fMRI scanning pre- and post-thrust manipulation to the thoracic spine. An 11-point Numeric Pain Rating Scale (NPRS) was administered for each session, pre- and post, to determine the subjects’ perceptions of pain intensity.

RESULTS: Overall, in subjects receiving manipulation, there was a significant reduction in cerebral activation in areas believed to be involved with the pain experience. These areas include the cortical insular, cingulate, somatosensory cortices, premotor and supplementary motor areas, and possibly the subcortical amygdala and thalami. Of the individuals reporting a reduction on the NPRS following thrust manipulation, only 37.5% noted an expectation of benefit with this intervention. In the sham comparator group however, there was a significant increase in BOLD activity to areas believed to be associated with determining the saliency of the pain experience. Seventy one percent of individuals having a positive expectation for manipulation, but not receiving it, experienced either no change or a worsening of symptoms.
Discussion - Conclusions: Our findings suggest that expectancies may modulate the pain experience for patients both behaviorally and at the neuronal level.

KEYWORDS: fMRI, neck pain, physical therapy.

CONTROL ID: 2301560
TITLE: EFFECTIVENESS OF TRIGGER POINT DRY NEEDLING FOR MULTIPLE BODY REGIONS: A SYSTEMATIC REVIEW
AUTHORS (LAST NAME, FIRST NAME): Boyles, Robert E.1; Fowler, Rebecca1; Ramsey, Derek1; Burrows, Erin1

ABSTRACT BODY:
Background & Purpose: Trigger point dry needling (TDN) is commonly used to treat musculoskeletal pain related to myofascial trigger points (MTrPs). To date, no systematic review of high-quality randomized controlled trials (RCTs) investigating TDN to multiple body regions exists. The aim of this review is to determine the effectiveness of TDN based on high-quality RCTs for all body regions.

Methods: PubMed, PEDro, CINAHL, Cochrane, and reference lists were searched for the years 2000-2013 and the terms “trigger point dry needling,” “dry needling NOT trigger point,” “functional dry needling,” and “intramuscular manual therapy.” Inclusion criteria: RCTs with PEDro scores 6-10 investigating TDN. Exclusion criteria: duplicates, non-human subjects, non-English language, exclusive focus on acupuncture or medicinal injections. Three investigators searched databases, applied criteria, read, and assigned PEDro scores to every RCT.

Results: Fifteen studies met the criteria. As compared to either baseline or control groups, significant differences were found for pain (11 studies), range of motion (4 studies), and at least one item on function and quality of life measures (5 studies).

Discussion - Conclusions: The majority of high-quality studies included in this review show measured benefit from TDN for MTrPs in multiple body areas, suggesting broad applicability of TDN treatment for multiple muscle groups. Further high-quality research is warranted to standardize TDN methods to determine clinical applicability. This review was limited by inclusion criteria, timeframe, language, and databases searched.
KEYWORDS: Trigger Point, Dry Needling, Pain.

CONTROL ID: 2311992
TITLE: EFFECTIVENESS OF SPINAL MANIPULATION IN THE TREATMENT OF NON-MUSCULOSKELETAL DISORDERS: A SYSTEMATIC REVIEW
AUTHORS (LAST NAME, FIRST NAME): Boyles, Robert E.; Muller, Aynsley; Murphy, Elizabeth; Brownstein, Sarah
AUTHORS/INSTITUTIONS: R.E. Boyles, A. Muller, E. Murphy, S. Brownstein, Physical Therapy, University of Puget Sound, Steilacoom, Washington, UNITED STATES;

ABSTRACT BODY:
Background & Purpose: Many professions promote the use of adjunctive treatments such as spinal manipulation for the management of non-musculoskeletal disorders. Current research supports the use of spinal manipulation for musculoskeletal disorders, but there is a paucity of high-quality literature supporting its use for non-musculoskeletal conditions. The purpose of this study was to systematically review available literature regarding the effectiveness of spinal manipulation for the treatment of non-musculoskeletal disorders.

Methods: A search of Index to Chiropractic Literature, Pubmed, PEDro, CINAHL, Cochrane and reference lists was performed between March and April 2014. Randomized control trials (RCTs) that met inclusion criteria were assessed for quality, by 3 raters, using the 11-point PEDro scale. Studies scoring 10-11 were deemed to be of “excellent” methodological quality, studies scoring 7-9 were deemed “good” quality and studies scoring 6-4 were deemed “fair” quality. Studies scoring below 4 were deemed “poor quality.”

Results: The initial search yielded 2,324 articles covering 45 non-musculoskeletal conditions. Six studies (2 retrospective, 4 RCTs) met inclusion criteria. The following conditions were addressed in these studies: inner ear infection, infantile colic, asthma and chronic obstructive pulmonary disease. The PEDro scores of the RCTs ranged from 7-9, with a mean score of 8.25 +/- 0.975. These scores indicate “good” methodological quality across all of the articles reviewed. One study reported statistically significant improvement between groups for forced vital capacity, 6-Minute Walk Test and dyspnea scores. One study found significant improvements in self-reported quality of life and symptom severity, but there was no between group comparison. Two studies found no statistically significant changes in physiologic or self-reported outcomes.
Discussion - Conclusions: Upon review of the included studies, some outcome measures significantly improved with spinal manipulation. However, due to limitations in the methodological design of the studies, it is impossible to attribute these improvements to spinal manipulation alone. Therefore, the state of the current literature does not provide conclusive evidence that spinal manipulation has a positive effect on individuals with certain non-musculoskeletal disorders.

KEYWORDS: Non-musculoskeletal disorders, spinal manipulation, Systematic review.

CONTROL ID: 2302363
TITLE: PHYSIOLOGICAL EFFECTS OF MANUAL THERAPIES ON LUMBAR INTERVERTEBRAL DISCS - A SYSTEMATIC REVIEW
AUTHORS (LAST NAME, FIRST NAME): Mitchell, Ulrike H.¹; Helgeson, Kevin²
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K. Helgeson, Physical Therapy, Rocky Mountain University of Health Professions, Provo, Utah, UNITED STATES;
ABSTRACT BODY: Background & Purpose: The use of manual therapy has been recommended in the treatment of low back pain based on primarily mechanical and neurophysiological effects. Recent studies have measured the physiological effects of manual therapy on the intervertebral discs (IVD) that should also be considered during the selection of manual therapy for low back pain. The objective of this systematic literature review was to investigate the literature regarding possible physiological effects of manual therapies on the IVD.

Methods: Inclusion and exclusion criteria were set a priori. A literature search of published articles through December 2014 resulted in the identification of 239 articles; 233 articles had to be excluded; six clinical studies assessing the influence of manual therapy techniques on the physiology of the IVD remained for the review. Quality assessment was performed.

Results: Two studies investigated the effects of 30-minute intermittent traction on disc height and disc molecular transport in animal models, in vivo and in vitro. One in vivo animal study and one study using human subjects assessed changes of disc height associated with static traction. Three studies investigated the effects of lumbar spine thrust and
non-thrust mobilization on changes in water diffusion within the IVD.

**Discussion - Conclusions:** Degeneration of lumbar IVDs is recognized as a main factor in the development and progression of low back pain. One of the issues associated with degeneration is declining fluid flow and diminishing molecular transport capability within the IVD. This literature review has shown that fluid flow can be positively influenced by manual therapies; i.e. specific thrust and non-thrust lumbar spine mobilizations. Disc height, potentially also an indicator for fluid imbibition, can be influenced by intermittent and static lumbar traction. These results encourage further research into the ability of manual therapies to decelerate the age-related disc degeneration process.

**KEYWORDS:** joint mobilization, spinal manipulation, lumbar spine height change.

**CONTROL ID:** 2311458
**TITLE:** TRIGGER POINT DRY NEEDLING FOR THE TREATMENT OF HIP PAIN IN THE PRESENCE OF PELVIC FLOOR DYSFUNCTION: A CASE REPORT
**AUTHORS (LAST NAME, FIRST NAME):** Doster, Jennifer¹; Holt, Sherri¹
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**ABSTRACT BODY:**
**Background & Purpose:** There is a lack of evidence in the literature regarding treatment of hip pain in the presence of pelvic floor dysfunction with and without trigger point dry needling. This purpose of this case report is to discuss the successful outcome utilizing pelvic floor physical therapy, manual therapy and neuromuscular re-education to reduce hip pain.

**Description:** A 45 y/o female master’s swimmer referred to physical therapy (PT) for left (L) anterior / lateral hip pain following a three hour airplane flight. Symptoms increased with these functional activities: sitting, terminal stance phase of gait, flip turns, flutter kicks and lower body dressing. Pain on the Numeric Pain Rating Scale was 3/10 at best and 9/10 at worst. Symptoms decreased with rest. Prior to the onset of hip pain, she experienced low back pain after lifting her son, which spontaneously resolved with maintaining activity and gentle exercise. Her history was significant for a L4/5 posterior fusion secondary to osteomyelitis following vaginal delivery of her second child seven years prior. Examination revealed guarding of L lower extremity during terminal stance phase of gait, groin pain reproduced with hip range of motion (ROM), positive Trendelenburg test, poor recruitment of gluteals and positive Scour test. At the second visit,
patient reported new diagnoses of cystocele and rectocele, prompting the physical therapist to refer the patient for a pelvic floor PT assessment to determine any possible contributions to hip pain. Examination of the pelvic floor muscles (PFM) revealed deficits in strength and endurance, pain with palpation of the L obturator internus and L pelvic floor muscles. Treatment interventions included therapeutic exercise to improve PFM strength and endurance, soft tissue mobilization to the PFM, trigger point dry needling to the gluteals, tensor fascia lata, adductors and piriformis and lumbo-pelvic neuromuscular re-education and stabilization exercises.

**Outcomes:** Patient was seen for seven visits over 10 weeks. She was pain free with sitting, dressing, walking and swimming except occasionally modifying flip turns. PFM strength improved to 4/5. She was instructed to continue with her strengthening home exercise program independently.

**Discussion - Conclusions:** This case presents a successful outcome utilizing pelvic floor PT, manual therapy including trigger point dry needling, and neuromuscular re-education to reduce hip pain in the presence of faulty recruitment patterns.

**KEYWORDS:** trigger point dry needling, pelvic floor, hip pain.

**CONTROL ID:** 2312590

**TITLE:** MANUAL THERAPY TO ADDRESS POST HERNIA FIBROSIS CAUSING PELVIC FLOOR PAIN, DECREASED HIP RANGE, ANTEROMEDIAL THIGH AND CALF PAIN, AND LOWER EXTREMITY EDEMA: A CASE REPORT

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**AUTHORS/INSTITUTIONS:** T.M. Harvey, Functional Manual Therapy Fellowship Program, Steamboat Springs, Colorado, UNITED STATES;

**ABSTRACT BODY:**

**Background & Purpose:** Neuropathies are a complication following femoral hernia repairs. Multiple nerves may be involved due to pelvic trauma, surgery, mesh fibrosis, adhesions, or fascial entrapment. Presentations may include local edema due to lymphatic congestion, pelvic floor, vulvar or testicular pain, anteromedial thigh and medial calf pain, hyperalgesia, and exacerbate symptoms with walking. The purpose of this case study is to address post femoral hernia presentation and treatment in a patient presenting with symptoms not addressed by prior pelvic floor therapy physical therapy with a layered approach.
**Description:** A 56 y/o female, two years post femoral hernia repair, experienced right (R) sided hip, anteromedial thigh pain and edema, pelvic floor pain with intercourse, and medial calf pain with walking. She saw four specialists without resolution of pain. This case addresses the importance of decreasing adhesions to restore lymphatic flow and decrease neural entrapments contributing to medial thigh/lower leg pain with exertion, pelvic floor pain, and R hip limitations post femoral hernia repair through the use of manual therapy. Manual therapy techniques, such as soft tissue mobilization (STM) and neural mobilization, were used to decrease fascial restrictions around the femoral nerve, saphenous nerve, and anterior branch of the obturator nerve that contributed to the patient’s symptoms. She was treated over six sessions consisting of hip mobilizations, STM, neural mobilization, and lymphatic massage techniques.

**Outcomes:** The patient had an initial Pelvic Girdle Pain Questionnaire score of 44/100. At discharge it was a 5/100, indicating improvements in functional activities including walking. Initially, she reported an 8/10 pain on the Numeric Pain Rating Scale with donning her pants and hip flexion limited to 95°, pain with intercourse, pain applying lotion to her medial thigh initially, and positive femoral nerve stretch test. At discharge she had no pain with hip flexion to 120°, donning pants, intercourse, applying lotion to area, and a negative femoral nerve stretch. The only remaining area of pain was at the medial inguinal ligament attachment at pubic tubercle, which has been shown in research to remain sensitive due to suture attachments.

**Discussion - Conclusions:** This case study demonstrates the importance of manual therapy to address scar tissue or postsurgical fibrosis and hip range in a case where pain, decreased exercise tolerance, and neural entrapment interrupted the patient’s quality of life.

**KEYWORDS:** Pelvic Floor, Nerve Entrapment, Anteromedial Thigh.

**CONTROL ID:** 2319192
**TITLE:** CHANGES IN SHOULDER PAIN AND DISABILITY AFTER THRUST MANIPULATION IN SUBJECTS PRESENTING WITH SECOND AND THIRD RIB SYNDROME
**AUTHORS (LAST NAME, FIRST NAME):** Perreault, Thomas¹; Mourad, Firas²; Dunning, James³; Maselli, Filippo⁵; Giovannico, Giuseppe⁴; Fernandez-de-las Peñas, Cesar²
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ABSTRACT BODY:

**Background & Purpose:** Although high-velocity low-amplitude (HVLA) thrust manipulation to the thoracic spine has been previously found effective for individuals with shoulder pain, no studies have directly investigated the effects of thoracic spine thrust manipulation in individuals with shoulder pain secondary to second and third rib syndrome. The purpose of the study was to investigate changes in shoulder pain, disability and perceived level of recovery following two sessions of upper thoracic and upper rib HVLA thrust manipulation in patients with shoulder pain secondary to second and third rib syndrome.

**Methods:** A prospective case series of ten consecutive individuals with shoulder pain, with or without brachial pain, and a negative Neer impingement test, completed the Shoulder Pain and Disability Index (SPADI), the Numeric Pain Rating Scale (NPRS), and the Global Rating of Change (GROC). Patients received two sessions of HVLA thrust manipulation targeting the upper thoracic spine bilaterally and the second and third ribs on the symptomatic side. Outcome measures were completed following the first treatment session, at 48 hours, 1 month and 3 months.

**Results:** Using the Greenhouse-Geisser epsilon correction, a 1-way repeated measures ANOVA revealed a significant ($F = 59.997; p = .001$) decrease in shoulder pain and disability (SPADI) and a significant ($F = 63.439; p = .001$) decrease in resting shoulder pain (NPRS). For both pain (NPRS) and disability (SPADI), post hoc pairwise comparisons showed significant differences between the pre-treatment scores and each of the post-intervention scores through 3 months follow-up ($p < .05$). Large (Cohen’s $d = .8$ or greater) within-group effect sizes were found between pre-intervention data and all post-intervention assessments in both outcomes. Mean GROC scores (+6.8 at 3 months) indicated “a very great deal better” outcome at long-term follow-up.

**Discussion - Conclusions:** Patients with shoulder pain secondary to second and third rib syndrome who received upper thoracic and upper rib HVLA thrust manipulations experienced statistically significant reductions in pain and disability, and showed significant improvements in perceived level of recovery.

**KEYWORDS:** Shoulder Pain, Spinal Manipulation, Manual Therapy.
MANUAL PHYSICAL THERAPY FOLLOWING IMMOBILIZATION FOR STABLE ANKLE FRACTURE: A CASE SERIES

Background & Purpose: Ankle fractures commonly result in persistent pain, stiffness, and functional impairments. There is insufficient evidence for any particular rehabilitation approach after ankle fracture. Greater dorsiflexion range of motion (ROM) at immobilization removal predicts better long-term outcome, suggesting that addressing limited dorsiflexion ROM immediately after immobilization may be important. The purpose of this case series was to describe an impairment-based manual physical therapy approach to treating patients with conservatively managed ankle fractures.

Description: Patients with stable ankle fractures post immobilization were treated with manual physical therapy and exercise targeted at associated impairments in the lower limb. Manual physical therapy treatment was based on individual evaluation findings, tailored to likely patient tolerance using clinical reasoning and consisted of joint mobilization, soft-tissue mobilization, and manual muscle stretching. The dosage of manual physical therapy provided was documented by recording the technique, quantity, and grade of manual treatment performed and the exercises provided. The primary outcome measure was the Lower Extremity Functional Scale (LEFS). Secondary outcome measures included the Ankle Lunge Test (ALT), Numeric Pain Rating Scale, and Global Rating of Change (GROC). Outcomes measures were collected at baseline, and 4 and 12 weeks post-baseline.

Outcomes: Eleven patients (mean age 39.6 years, range 18-64; 2 male), post ankle fracture related immobilization (mean duration 48 days, range 21-75) were treated for an average of 6.6 sessions (range 3-10) over a mean of 46.1 days (range
Compared to baseline, statistically significant and clinically meaningful improvement were observed in the LEFS (P=.001; mean change, 21.9 points; 95% confidence interval [CI] 10.4, 33.4) and ALT (P=.001; mean change 7.8 cm; 95% CI: 3.9, 11.7) at 4 weeks. These changes persisted at 12 weeks. At 12 weeks, all patients rated their overall change in condition as at least “a great deal better” (GROC ≥ 6+).

**Discussion - Conclusions:** Statistically significant and clinically meaningful improvements in self-reported function and ankle range of motion were observed at 4 and 12 weeks following treatment based on impairment-based manual physical therapy. All patients tolerated treatment well. Results suggest this approach may have efficacy in this population. The detailed documentation of dosage of treatment provided may give clinical guidance for treating this population.

**KEYWORDS:** Clinical reasoning, dosage of manual therapy, mobilization.

**CONTROL ID:** 2300438

**TITLE:** USE OF MANUAL THERAPY AND SELF-MOBILIZATION STATUS-POST HIP ARTHROSCOPY FOR FEMOROACETABULAR IMPINGEMENT: A CASE SERIES

**AUTHORS (LAST NAME, FIRST NAME):** Mathers, Jessie¹; Schmidt, Michael¹; Reiman, Michael²; Cunningham, James³; Allen, Amanda¹; Fiander, Christopher¹

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**ABSTRACT BODY:**

**Background & Purpose:** Manual therapy has been studied in patients with hip osteoarthritis (OA) and, to a lesser extent, non-operative femoroacetabular impingement (FAI). Current evidence for use of manual therapy in patients post hip arthroscopy is lacking. The purpose of this case series is to highlight the utilization of appropriate skilled manual therapy and supportive self-mobilizations to address impairments common to this population.

**Description:** Three patients [2 females, 1 male; mean age: 37.6 (range 33-42 years)] were referred to physical therapy (PT) post hip arthroscopy (surgical procedures included labral repair, debridement and femoral and/or acetabular osteochondroplasty) participated in this case series. No patients had OA. Outpatient physical therapy treatment was initiated 3-4 days post surgery; discharge from PT occurred at mean post-operative week 17 (range 15-20 post-operative weeks). Various manual therapy techniques, as well as directed self-mobilizations, were implemented as supportive post-
surgical treatments based on clinical reasoning and extrapolation of literature support for these treatments in OA and non-operative FAI patients.

**Outcomes:** Outcome measures were collected at regular intervals for each patient. Lower Extremity Functional Scale (LEFS) ratings were collected at initial visit and at discharge. The mean improvement on the LEFS was 53.6 points (range 48-61). Global Rating of Change was collected throughout the treatment and at discharge. All patients reported being "a great deal better." Initial post-operative Numeric Pain Rating Scores were initially 1-2/10 and at discharge 0-1/10 for all patients.

**Discussion - Conclusions:** All patient exhibited successful post-operative outcomes as demonstrated by clinically meaningful improvement in function. Treatment included individualized programs combining progressive exercise, manual therapy and home exercises that included self-mobilizations. Although improvement due to natural progression of post-operative conditions cannot be eliminated, manual therapy interventions appeared integral for successful outcomes in the case series and may have potential as a component in a multi-modal treatment approach in the population overall. Due to the prevalence of hip arthroscopy, it is increasingly important that physical therapists investigate and develop evidence-based treatment strategies specific to this population.

**KEYWORDS:** hip, arthroscopy, mobilization.

**CONTROL ID:** 2316240
**TITLE:** THE ROLE OF MANUAL THERAPY AND THERAPEUTIC EXERCISE IN REDUCING PAIN, IMPROVING MOTION, AND RESTORING FUNCTION IN PATIENTS WITH OSTEOARTHRITIS THE HIP JOINT: A CASE SERIES
**AUTHORS (LAST NAME, FIRST NAME):** Slaven, Emily¹; Davidson, Melissa ¹; Edwards, Clayton¹; Elliott, Mallory ¹; Meyers, Jennifer ¹
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**ABSTRACT BODY:**
**Background & Purpose:** Osteoarthritis (OA) of the hip joint frequently results in pain and limited motion, which can alter an individual’s function, in particular, the ability to walk. Physical therapy (PT), specifically manual therapy and
therapeutic exercise, have been proposed as mechanisms to reduce pain, improve motion, and restore function. However, there is limited evidence on the outcome of an individualized program of PT on pain, motion, and function where all three elements are recorded concurrently. The purpose of this study was to identify the combined effect of manual therapy and therapeutic exercise on pain, motion, and function in individuals diagnosed with hip OA.

**Methods:** Five female study participants with hip OA and a mean age of 68 years of age (range 51-75) were included in this case series. An evaluation was completed which included baseline testing using the following self-reported and physical performances: the Lower Extremity Functional Scale (LEFS), the Harris Hip Score (HHS), the Numeric Pain Rating Scale (NPRS), Timed Up and Go (TUG) test, 40-meter fast-paced walk test, and the 30 second chair stand test. Instrumented gait analysis was performed. Temporo-spatial, kinematic, and kinetic data were collected. All participants then received individualized manual therapy and therapeutic exercises for a mean of 7 treatment sessions (range: 5-8) over four weeks. All outcomes measures were tested at the completion of PT and again at 12 weeks.

**Results:** Four of the five participants demonstrated improvements in the NPRS. All the participants except one demonstrated functional gains, as identified by the LEFS and HHS, with changes in scores greater than the minimal detectable change in the LEFS. Improvements were noted in the TUG scores, walking speed, using the 40 meter fast-paced walk test, and the 30-second chair stand test in three of the five participants. The results from the instrumented gait analysis were more variable. Only two participants demonstrated an increase in hip extension between the initial and 4 week follow up testing. The duration of stance in the affected lower limb improved in four participants, but the symmetry between lower limbs in stance duration only improved in two participants.

**Discussion - Conclusions:** Individualized PT for patients with hip OA can lead to changes in function, pain, and motion. The changes in pain and function were more consistent than the changes in motion, which suggests that motion changes may be less significant in restoring function than previously thought.

**KEYWORDS:** Hip, Manual therapy, Outcomes.
Background & Purpose: The purpose of this study was to examine lower trapezius (LT), middle trapezius (MT), and serratus anterior (SA) muscle strength in individuals with and without neck pain. Impairments in scapulothoracic muscle performance have been associated with neck pain. Additionally, clinical guidelines for neck pain have suggested coordination, strengthening, and endurance exercises for these muscles. It is not clear whether individuals with neck pain present with LT, MT, and SA muscle strength deficits when compared to asymptomatic individuals; little evidence is available which compares scapulothoracic muscle strength between limbs in those with one-sided neck pain.

Methods: This descriptive cross-sectional study examined 22 individuals with chronic neck pain and 17 asymptomatic individuals. Participants underwent strength testing for the LT, MT, and SA muscles bilaterally using a hand-held dynamometer. Data analyses included descriptive statistics in addition to paired t-tests for within group strength comparisons and independent t-tests for between group strength comparisons.

Results: Within group strength comparisons between limbs varied by group and by muscle. For individuals with neck pain, significant differences in strength between limbs for the LT (P<0.01) and MT (P<0.01) were present, but not for the SA. In contrast, no difference in strength between limbs for the asymptomatic group was found in any of the muscles examined. Between group differences were found for each muscle examined. Individuals with neck pain were significantly weaker than asymptomatic individuals for the LT (p= 0.04), MT (p= 0.02), and SA (p<0.01).

Discussion - Conclusions: Muscle weakness in the LT, MT, and SA muscles is present in individuals with neck pain. Strength of these muscles should be examined in patients who present with neck pain. Further investigation is warranted to determine the best management strategies and to determine if improvements in strength correspond to improvements in neck pain and function.

KEYWORDS: axioscapular, trapezius, scapula.
ADHESIVE CAPSULITIS PROVIDED IN AN OUTPATIENT PHYSICAL THERAPY AND PHYSICIAN SETTING

AUTHORS (LAST NAME, FIRST NAME): Bell, Lesli R.; Fenton, Jonathon E.; Zaruba, Richard

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ABSTRACT BODY:

Background & Purpose: Manipulation under anesthesia (MUA) is normally done in a surgical suite under general anesthesia using a ballistic long lever maneuver for the MUA by an orthopedic surgeon. Roubal and Placzek proposed that the use of translatory mobilizations would result in fewer secondary injuries to the rotator cuff and capsule, while improving the effectiveness of the procedure. Physical therapists (PT) are well trained to use translatory mobilizations to restore normal motion. The aim of this study was to examine the effects of translatory mobilizations applied by a PT to patients with adhesive capsulitis, while under conscious sedation administered by a physician (DO), who were then followed by six weeks of outpatient physical therapy.

Methods: Patients, diagnosed with adhesive capsulitis by the DO using ultrasound imaging, were given the option of having procedure done by the PT while under conscious sedation by DO. The patients completed the QuickDASH and reported high, low and current pain over the past 24 hours on the Visual Analog Scale (VAS). Shoulder active and passive range of motion (AROM, PROM) were measured for flexion (flex), scaption (scap), and external rotation (ER) at 45° and 90° of abduction (abd) or at the maximum abd attainable. Sedation by the DO included a nerve block to the suprascapular nerve, dilatation of the capsule, and intravenous sedation prior to the procedure. The PT applied translatory mobilizations in restricted positions to the affected shoulder. PROM, AROM, and VAS were then remeasured after the procedure and again at one and six weeks post procedure. The QuickDASH and Global Rating of Change (GRC) were administered at one and six weeks post procedure.

Results: Preliminary results from a retrospective review of five patients that have undergone the procedure demonstrated the following average change at follow up to procedure. The GRC averaged +3/+5. The VAS average decrease was -1.7/-3.1 for VAS. Increase in flex AROM was +47°/+68°; increase in flex PROM was +38°/+46° at the one and six week follow up respectively.

Discussion - Conclusions: Preliminary results indicate that this multidisciplinary procedure warrants further
investigation. All patients demonstrated improvement in areas measured without exception. It is believed that this procedure will demonstrate significant decreased risks of secondary complications and total cost compared to surgical debridement or MUA done in a surgical suite.

**KEYWORDS:** adhesive capsulitis, Multidisciplinary, Manual therapy.

**CONTROL ID:** 2316335
**TITLE:** A DESCRIPTION OF CIVILIAN PHYSICAL THERAPISTS' KNOWLEDGE IN MANAGING MUSCULOKELETAL CONDITIONS
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**ABSTRACT BODY:**
**Background & Purpose:** Physical therapists in the uniformed services have shown to have knowledge in musculoskeletal medicine in order to practice as a direct access provider. However, research of musculoskeletal knowledge in the civilian physical therapist population is lacking. The purpose is to describe knowledge in managing musculoskeletal conditions among civilian physical therapists.

**Methods:** This study involved a cross-sectional, electronic survey completed in August and September of 2014. The survey consisted of musculoskeletal competency questions that were previously validated. Descriptive statistics of the participants and logistic regressions were calculated using SPSS 22.0. Binary logistic regressions were used to correlate the frequency variables with performing at competency level on the musculoskeletal exam.

**Results:** A total of 22,750 surveys were sent to physical therapists in five states. Two thousand sixty-five (2,065) surveys were returned for a response rate of 10.6%. Four hundred eighty (408) responses were included for analysis. The average score on the exam was 65.08% and only 28.2% of all respondents met the competency cutoff score. Respondents with an OCS/SCS were 3.091 times more likely to perform at the competency level on the examination with a p-value of <0.001 and a confidence interval >95%.

**Discussion - Conclusions:** The results indicate that civilian physical therapists scored lower than their military
counterparts on the musculoskeletal exam. Potential reasons for this include less autonomous practice responsibilities and a disparity in educational experiences. Using previous research as a comparison, physical therapists have greater knowledge than physician interns and all physician specialties, except for orthopedics, in managing musculoskeletal conditions. Certification may enhance civilian physical therapists' ability to practice with greater autonomy when managing musculoskeletal conditions.

**KEYWORDS:** musculoskeletal competency, direct access, orthopaedic certified specialist.

**CONTROL ID:** 2319423
**TITLE:** EXAMINING PHYSICAL THERAPY STUDENTS' ABILITY TO EVALUATE FINDINGS FROM AN ORAL HEALTH SCREENING IN EVALUATION AND MANAGEMENT OF THE TEMPOROMANDIBULAR JOINT.

**AUTHORS (LAST NAME, FIRST NAME):** Markowski, Alycia¹; Greenwood, Kristin¹

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**ABSTRACT BODY:**

**Purpose:** Medical screening is the process of evaluating patient examination data for the purpose of identifying health risk factors and/or the need for a referral for further medical testing for suspected medical pathology. Oral health screening (OHS) is the process of screening a patient for presence of oral disease or risk factors for oral disease and providing guidance and education on oral health maintenance, prevention, and early referral. OHS is the responsibility of all first contact health care providers to ensure appropriate and timely oral health care is being rendered to needed populations. The purposes of this report are to highlight the importance of including OHS education in a physical therapy (PT) curriculum and to evaluate the students’ ability to manage OHS findings within their evaluation and treatment of the temporomandibular joint (TMJ).

**Description:** One hundred PT students participated in an oral health module. The oral health module was developed from existing literature and resources. The oral health screen education components consisted of oral anatomy and characteristics of healthy teeth, performance of an oral, face, and neck examination, normal and abnormal findings, indications for referral and education. Teaching methods consisted of formative and didactic instruction. Following this teaching, a simulation experience was used to evaluate a student’s ability to perform an OHS and identify the need and urgency for referral and provide the patient with specific education as needed. Data were collected from a written referral
form completed by each student. Overall, 85% of the class identified the appropriate referral and 46% identified appropriate education. In cases that focused on preventative care, students identified appropriate referral 68% of the time and case specific education 75% of the time. In pathology based cases requiring urgent care, students referred appropriately 95% percent of the time but lacked appropriate education (12%).

**Summary of Use:** Inclusion of OHS is an important component of medical screening. According to the Surgeon General's Report on oral health in 2000 dental care is the most common unmet health need. Physical therapists are well positioned to incorporate OHS into evaluation and treatment of the TMJ to meet this need. It is recommended that OHS should be including in PT curriculum. Education outcomes may be improved by providing instruction on symptom management and recognition of symptoms progressing form urgent to emergent.

**KEYWORDS:** Oral Health Screen, Temporomandibular joint, Education.

**CONTROL ID:** 2316636
**TITLE:** CHANGES IN FORCES IN THE UPPER SPINE DURING A BRIDGING ACTIVITY
**AUTHORS (LAST NAME, FIRST NAME):** Witt, Dexter W.¹; Contner, Alex¹; Myers, George¹; Mulligan, Elizabeth¹; Smith, Rose¹; Talbott, Nancy¹
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**ABSTRACT BODY:**
**Background & Purpose:** In the hooklying position, weight is distributed through the areas of the feet and entire spine that is in contact with a supporting surface. During a bridge, that same body weight must be divided between both feet and the smaller surface area of the upper spine that remains in contact with the supporting surface. Because the use of a bridge position has been proposed as a method to augment and localize an anterior/posterior thrust to the upper thoracic spine, any increase in the upper body forces simply due to the bridge should be considered during the performance of the manipulation. The purpose of this study was to quantify the forces through the lower extremities and the upper spine during a bridging activity.

**Methods:** Nineteen subjects consented to participate. In a hooklying position, a force plate was placed under both feet and under the head/neck area. Knees were flexed to 90°. Subjects were instructed to perform a bridge by lifting their pelvis and extending their hips until the anterior super iliac spines were in line with the knees. The bridge was held for
five seconds. Forces were recorded under each force plate during each of three trials. The process was then repeated with a force plate under each of the feet.

**Results:** At rest, the mean vertical force measured under both feet was 25.3 pounds, or 15.2% of the body weight. This force significantly increased to 54.3 pounds, or 32.5% of the body weight, during the bridge. At rest, the mean vertical force under the upper spine was 72.7 pounds, or 43.0% of the body weight. This force significantly increased to 111.9 pounds, or 66.4% of the body weight, during the bridge. During the bridge, there was no significant difference between the forces in the right leg (27.8 pounds) and the left leg (27.7 pounds).

**Discussion - Conclusions:** During a bridge, the forces under the upper thoracic spine, head and neck increased close to approximately 40 pounds, or 23% of the body weight. When placing a patient into a bridge for a thrust, therapists should be aware that the force in the upper spine is already greater than at rest. While it could be argued that less force may be then needed for the manipulation, the additional force from the bridge position is not negligible and should be taken into account during that manipulation to assure the safety of the patient.

**KEYWORDS:** Bridging, Manipulation, Forces.
Methods: Fourteen healthy adults participated. While sitting, the arm was placed in the NP with the ultrasound (US) transducer over the superior glenohumeral joint. US images were taken at rest and as a maximal inferior translational force was applied through a hand held dynamometer. This process was repeated three times in the NP and in the AP. The subject was then placed in a supine position and testing performed three times in the OP. The humeral head position was measured in reference to the superior acromion and the amount of movement determined by the distance the humeral head moved from the rest position. Stiffness was calculated as force per millimeter (N/mm).

Results: Intra-session, intra-class correlations coefficients values were good for the NP (.841) and for the AP (.739) and poor for the OP (.392). Mean stiffness values were highest in the AP (149.1 N/mm) and significantly lower in the in the OP (86.7 N/mm). Mean stiffness in the NP was 113.9 N/mm, which was not significantly different from the other positions.

Discussion - Conclusions: Higher correlation values suggest that testing for stiffness is clinically reliable in either the NP or the AP, both which involve uniplanar positioning and single plane forces. Lower correlation values in the OP do not support the ability to repeatedly assess stiffness in the OP position. Assessment in the OP involves positioning and movement in multiple planes, a factor that may be more difficult to replicate between assessments. Because of the differences in the stiffness values in the three positions, results of this study also suggest that clinical assessments for stiffness should be repeated in a single test position.

KEYWORDS: stiffness, glenohumeral joint, reliability.
**Background & Purpose:** Segmental stabilization exercise has been shown to be effective in the rehabilitation of low back pain (LBP). Due to the isometric nature of this type of exercise, manual therapists use various verbal instructions to elicit lumbar multifidus muscle contraction during segmental stabilization exercise. The purpose of this study was to assess whether or not three verbal instructions would alter muscle thickness of the lumbar multifidus differently in asymptomatic individuals and patients with LBP.

**Methods:** Three verbal instructions commonly used to elicit lumbar multifidus muscle contraction were selected for this study: (1) breathing normally and without moving your spine, swell the muscle underneath the transducer, (2) breathing normally and without moving your spine, draw your belly button in towards your spinal column, and (3) breathing normally and without moving your spine, think about tilting your pelvis but without really doing it. Lumbar multifidus muscle thickness at L4-L5 and L5-S1 was determined using parasagittal ultrasound imaging. Measurements of muscle thickness were collected at rest and during three verbal instructions from 21 asymptomatic adults and 21 patients with LBP. Percent changes of muscle thickness during contraction and at rest were compared between groups and across each verbal instruction using ANOVAs with repeated measures ($\alpha = 0.05$).

**Results:** At L4-L5, there was no significant interaction between the two groups and the three verbal instructions ($p = 0.363$), but a significant main effect of verbal instruction ($p = 0.049$) was found. Post-hoc analysis showed a significance difference between verbal instruction #2 and #3 ($p = 0.009$). The results indicated that both asymptomatic participants and participants with LBP achieved a higher percent change in lumbar multifidus muscle thickness at L4-5 with verbal instruction #3 than with verbal instruction #2. At L5-S1, no significant interaction ($p = 0.374$) or main effect of verbal instruction ($p = 0.643$) was found. Further, there was no main effect of group at either segment ($p = 0.401$ for L4-5, $p = 0.294$ for L5-S1).

**Discussion - Conclusions:** The results of the study suggest that both groups responded similarly to the three verbal instructions. Clinicians may consider selecting an appropriate verbal instruction to achieve an optimal lumbar multifidus contraction at L4-5.

**KEYWORDS:** Low back pain, verbal instruction, muscle activation.

**CONTROL ID:** 2319574
Background & Purpose: Posterior glenohumeral mobilizations can be utilized to promote positive outcomes in patients with shoulder dysfunction. Limited evidence is available, however, that supports the ability to repeatedly utilize similar mobilization movements between sessions. While the pathways that explain the effects of peripheral mobilization have yet to be fully described, producing the same amount of movement on different days may be needed before the stimuli responsible for mobilization effects can be fully characterized. The purposes of this study were to measure the amount of posterior humeral movement during posterior humeral mobilizations on two separate days and to determine the intersession reliability during three grades of mobilization.

Methods: Eleven healthy subjects were tested. In supine, the shoulder was positioned in 55° of abduction and 30° of horizontal adduction. An ultrasound transducer was placed over the anterior glenohumeral joint. The position of the humerus was recorded at rest and as a single examiner applied a grade one, a grade two and a grade three posterior mobilization. Each grade was repeated three times on both arms. All measurements were repeated one week later. Posterior movement of the humeral head during the mobilization was determined by measuring the position of the humeral head in reference to the coracoid process.

Results: Grade 1 mean movement was 2.3 mm during session one, which was significantly different from the 2.9 mm of movement measured during session two. Grade 2 mean movement was 8.1 mm during session one and 8.6 mm during session two. Grade 3 mean movement was 11.3 mm during session one and 11.5 mm during session two. Grade 2 and grade 3 differences between sessions were not significant. Intersession intraclass correlation coefficients were .810 for grade 1, .647 for grade 2 and .549 for grade 3.

Discussion - Conclusions: Although the differences between sessions were small for each grade of posterior mobilization, reliability was lower at higher grades. These results emphasize the variability between sessions of a single examiner who is attempting to mobilize the same subject in a similar manner on two different days. Characteristics of the subject, such as muscle activation and familiarity with the mobilizations, may also have contributed. Further study is
needed to determine if this variability can be decreased within a single examiner, a step that could assist in the understanding of the physiological effects of peripheral mobilization.

**KEYWORDS:** Mobilization, Shoulder, Reliability.

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**CONTROL ID:** 2314607  
**TITLE:** DRY NEEDLING IN THE MANAGEMENT OF CHRONIC KNEE PAIN AFTER TOTAL KNEE ARTHROPLASTY: A CASE REPORT  
**AUTHORS (LAST NAME, FIRST NAME):** Gattie, Eric R.¹; Sabadis, Sebastian¹; Snodgrass, Suzanne³; Cleland, Josh²  
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**ABSTRACT BODY:**  
**Background & Purpose:** Dry needling is a technique in which a fine needle is used to penetrate the skin, subcutaneous tissues, and muscle with the intent to mechanically disrupt tissue without the use of an anesthetic. Dry needling is emerging as a treatment modality that is widely used clinically to address a variety of musculoskeletal conditions. The purpose of this case study is to describe the outcomes of a multi-modal approach utilizing manual therapy techniques including dry needling, soft tissue mobilization, and an exercise program in a patient with chronic knee pain and hamstring trigger points following total knee arthroplasty (TKA).

**Description:** A 49 y/o female presented to physical therapy one year following a right TKA with a chief complaint of posterior medial thigh pain ranging from 3/10 at best to 10/10 at worst on a Numeric Pain Rating Scale (NPRS). Functionally, she reported difficulty standing, walking, and performing her home and work duties as a hairdresser. Her goal for physical therapy was to be able to go up and down stairs more easily and to tolerate prolonged standing at work. Relevant physical examination findings included right knee range of motion 0-122°, knee extension manual muscle test (MMT) 5/5, knee flexion MMT 4/5 and painful, hamstring flexibility measured with straight leg raise 80° (right), 95° (left), and active trigger points in the right medial hamstrings. Treatment focused on trigger point dry needling of hamstrings, stretching, and progressive resistance exercises.
Outcomes: After five visits over six weeks, the patient reported a decrease in the NPRS from 8/10 to 0/10. Lower Extremity Functional Scale scores increased from 46/80 to 70/80. She was able to return to full time employment as a hairdresser.

Discussion - Conclusions: In this particular case, dry needling was effective for addressing trigger points in the hamstrings and reducing the patient’s chronic thigh pain. After only five visits of physical therapy, she had full resolution of her chronic knee pain and had regained the ability to work her full shift. Patients with chronic pain after TKA with trigger points in the hamstrings may benefit from the addition of trigger point dry needling.

KEYWORDS: Dry Needling.
during sport and no significant improvements on the LEFS. After traditional conservative PT failed to resolve symptoms, the patient was treated with CTF and LBM. CFT was a mobilization technique performed during motion using an elastic band wrapped around the Achilles tendon as well as gastrocnemius and soleus muscles. LBM was a patient-guided soft tissue mobilization applied to the Achilles tendon.

**Outcomes:** The primary outcomes of interest were the LEFS and the ability to participate in sport without pain. The patient and family’s goal was for her to be able to dance and cheer without Achilles pain. After two PT sessions focusing on CTF and LBM, the patient was able to dance and cheer without pain and scored a 79/80 on the LEFS. She was discharged with a home exercise program consisting of CTF and LBM and eccentric exercise.

**Discussion - Conclusions:** The patient’s LEFS score and ability to participate in sport without pain improved significantly after beginning CTF and LBM. The outcomes of this case study suggest that this intervention may be a viable adjunct treatment for Achilles tendinopathy; however more research needs to be performed through a randomized controlled trial.

**KEYWORDS:** Achilles Tendinopathy, Manual Physical Therapy, Adolescent.

**CONTROL ID:** 2319649
**TITLE:** UTILIZATION AND CONFIDENCE PERFORMING HIGH VELOCITY LOW AMPLITUDE THRUST MANIPULATION IN PRACTICE: A SURVEY OF DOCTORS OF PHYSICAL THERAPY
**AUTHORS (LAST NAME, FIRST NAME):** Lwin, Janice
**AUTHORS/INSTITUTIONS:** J. Lwin, Kellaya Performance, San Diego, California, UNITED STATES;
**ABSTRACT BODY:**

**Background & Purpose:** The literature supports favorable outcomes treating orthopaedic dysfunctions with high velocity low amplitude thrust (HVLAT) manipulation. Incorporating HVLAT techniques into treatment decreases recovery time and disability. To be effective practitioners, physical therapists must confidently utilize this treatment intervention. This research report examines clinical utilization/reported confidence of HVLAT manipulation by Doctors of Physical Therapy (DPTs).

**Methods:** Licensed DPTs practicing in outpatient orthopaedic settings were sent surveys through association contacts. The survey used yes/no/multiple choice questioning to report utilization/confidence of HVLAT manipulation for
treatment and if the skill was learned in their physical therapy (PT) program, residency/fellowship or post-graduate continuing education.

**Results:** Thirty-seven DPTs returned surveys from 15 PT programs (graduating 1994-2014) in eight states. Reportedly, 73% utilize HVLAT manipulation. This technique was performed on 1-2 patients/week (p/w) by 56% clinicians, 28% treated 3-4 p/w, 16% treated >5 p/w. Forty-nine percent learned HVLAT manipulation in their PT program, 14% in residency/fellowship, 37% from post-graduate continuing education. Thirty percent are reportedly “confident” using HVLAT manipulation in treatment, 37% are “moderately confident”, 33% are “very confident.” Only 50% of clinicians who learned HVLAT manipulation in their PT program are reportedly “very confident,” but 89% who learned the skill through residency/fellowship or post-graduate continuing education were “very confident” with these techniques.

**Discussion - Conclusions:** Evidence based research validates the effectiveness of HVLAT manipulation to treat dysfunction and improve recovery time; therefore, effectual PT intervention should include these techniques. However, HVLAT manipulations are under-utilized on only 1-2 p/w and only 1/3 of PTs are reported to be “very confident” using these techniques. Effectiveness of treatment is diminished through lack of utilization/confidence performing HVLAT techniques. To improve patient care/outcomes, PTs must examine strategies to improve utilization/confidence of HVLAT manipulation. Since 89% of PTs who learned HVLAT techniques in post-graduate settings were “very confident” using the skill but only 50% trained in their PT program were “very confident”, it behooves PTs to seek continuing education, including residency/fellowships, in order to gain confidence and skill performing HVLAT manipulation and to maximize treatment outcomes.

**KEYWORDS:** HVLAT, confidence, utilization.

**CONTROL ID:** 2312472
**TITLE:** THE SHOULDER PAIN AND DISABILITY INDEX: IS IT SENSITIVE AND RESPONSIVE TO IMMEDIATE CHANGE?
**AUTHORS (LAST NAME, FIRST NAME):** Riley, Sean¹; Cote, Mark²; Swanson, Brian³; Tafuto, Vincent¹; Sizer, Phillip⁴; Brismee, Jean-Michel⁴
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Background & Purpose: The Shoulder Pain and Disability Index (SPADI) is an outcome tool that is widely used to measure shoulder pain and disability. The SPADI is designed to detect changes in shoulder pain and disability after a one-week interval. While the SPADI does not appear to be an appropriate measure of change in time periods of less than one week, it has been routinely used during such a shortened timeframe in both clinical research and clinical practice. The purpose of this study was to determine if the SPADI or its subscales could detect immediate changes in pain and function following an intervention by comparing it to changes on the Numeric Pain Rating Scale (NPRS).

Methods: Ninety-two subjects with primary complaints of non-post-surgical shoulder pain completed the NPRS and the SPADI prior to and immediately following manual therapy interventions directed at the thoracic spine.

Results: The SPADI pain subscale detected statistically significant differences that were also detected using the NPRS. In addition, the SPADI pain score and the NPRS scores were moderately correlated between the pre-intervention SPADI and NPRS scores ($r=0.49-0.61$, $p<0.001$) and post-intervention SPADI and NPRS scores ($r=0.49-0.67$, $p<0.001$). Although statistically significant differences were observed for the SPADI pain and total score pre-intervention to immediate post-intervention, the small effect sizes observed for the Cohen’s d and Standardized Response Mean (0.18 to 0.27 and 0.39 to 0.40, respectively) suggest a low sensitivity to change. The calculated minimally important difference values for the SPADI pain and total score pre-intervention to immediate post-intervention were 6.04 to 10.07 and 5.78 to 9.64, respectively. These values were larger than the observed mean differences calculated of 5.60 for the SPADI pain score and 3.49 for the SPADI total score pre-intervention to immediate post-intervention suggesting that the SPADI was not responsive to immediate change.

Discussion - Conclusions: Since the SPADI may have to be employed in durations of less than one week secondary to third party payer requirements, it is valuable to validate the SPADI for this particular use. Although SPADI scores demonstrated low sensitivity and responsiveness to immediate changes, the SPADI pain scale was able to detect changes in durations of less than one week.

KEYWORDS: Outcome Measures, Shoulder Pain and Disability Scale, Numeric Pain Rating Scale.
USE OF ADVANCED TREATMENT TECHNIQUES INCLUDING ECCENTRICS AND DRY NEEDLING IN A PATIENT WITH TENDINOSIS OF THE LONG HEAD OF THE TRICEPS

Background & Purpose: Chronic tendinosis is identified by pain with palpation at the tendon as well as painful resisted motion. Eccentric loading has been shown to be an effective treatment of chronic Achilles and patellar tendinosis. Dry needling has also been shown to be beneficial in the treatment of chronic tendinosis. The purpose of this case report is to describe the examination and treatment of a patient with chronic tendinosis of the long head of the triceps utilizing both eccentric loading and dry needling.

Description: A 35 y/o male with a five month history of right posterior shoulder pain during overhead activities. He rated his pain 8/10 on the Numeric Pain Rating Scale (NPRS). Examination revealed tenderness to palpation of the long head of the triceps and reproduction of his concordance sign with resisted triceps contraction in an elongated position. Manual therapy intervention initially consisted of thrust manipulation to the thoracic spine, joint mobilizations of the glenohumeral joint, and eccentric loading of the triceps tendon. Although these techniques resulted in improved mobility and decrease in pain, the patient continued to present with pain during overhead activities. Dry needling to the long head of the triceps tendon and periosteal pecking to the infraglenoid tubercle were added to further stimulate the inflammatory response.

Outcomes: The patient was treated for eight visits over five weeks. Dry needling was introduced during the third visit resulting in significantly reduced pain by the subsequent visit, with a steady decline of pain until discharge. QuickDASH score improved, decreasing from 16% to 5%, exceeding the minimal clinically important difference. The patient achieved full pain-free shoulder range of motion and was able to resume activities of daily living and weight lifting activities without pain at discharge.
Discussion - Conclusions: This case report describes the outcomes of a patient with chronic tendinosis treated with eccentric loading combined with dry needling. The significant improvement of pain and function suggests that dry needling may be a useful conjunct treatment in the management of patients with chronic tendinosis.

KEYWORDS: Tendinopathy, Manual Therapy, Shoulder Pain.

CONTROL ID: 2308254
TITLE: INTERNATIONAL COLLABORATION IN MANUAL PHYSICAL THERAPY: AN OPENING OF IDEAS AND OPPORTUNITIES
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ABSTRACT BODY:
Background & Purpose: Internationalization allows the world of higher education to become more connected. Partnerships between physical therapy (PT) education programs internationally open new opportunities for learning and cultural exchange. Relatively few international collaborative immersion experiences have been described. The purpose of this study was to discover the meaning of an international manual therapy collaborative immersion experience for the traveling PT students and the hosts.

Methods: Eleven University of Vermont (UVM) final year students and one postgraduate student traveled to Bond University (Australia) for a two week immersion experiences and participated in MT coursework, seminars, and cultural activities. The manual therapy content was an advancement and refinement of techniques taught in the entry-level curriculum at both Universities. For example, spinal mobilization techniques were progressed to all spinal level manipulations. Neural mobilizations were performed under real time ultrasound imaging to watch for nerve movement between interfacing tissues. During the two week immersion, journal data was collected from the UVM participants. Bond University students and faculty were surveyed at the end of the experience. Interpretative Phenomenological Analysis methodology was used to determine the meaning of this collaborative experience.

Results: The following themes emerged: 1) Learning, the acquisition of new skills both professionally and personally, 2)
Collaboration, development of new relationships and opportunities with staff and students, 3) Experiencing the ‘Other’, observations made from immersion while abroad.

**Discussion - Conclusions:** Themes identified were similar to ones established within the literature. Additionally, both UVM and Bond participants reported gaining advanced manual therapy skills in palpation and joint manipulations that they felt would help them professionally. Coming together and learning from international experts increased the breadth and depth of the experience for all participants. Many participants also felt that participating in this manual therapy collaboration opened up the possibilities of future travel and work abroad. The international manual therapy collaboration between UVM and Bond University has successfully initiated new dialogue about international collaborations. This study supports the potential for future collaborative immersion opportunities between education programs to prepare emerging professionals to work in an increasingly global environment.

**KEYWORDS:** Manual Therapy, Internationalization, Education.

**CONTROL ID:** 2300713
**TITLE:** THE RELIABILITY OF THE CERVICAL RELOCATION TEST ON PEOPLE WITH AND WITHOUT A HISTORY OF NECK PAIN
**AUTHORS (LAST NAME, FIRST NAME):** Schenk, Ron¹; Burke, Sarah¹; Lynch, Kristina¹; Moghul, Zakkee¹; Young, Craig¹; Saviola, Kristen²
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**ABSTRACT BODY:**
**Background & Purpose:** Physical therapy intervention is often sought to treat cervical spine conditions and a comprehensive physical therapy examination has been associated with more favorable outcomes. The cervical relocation test (CRT) is one method used to assess joint position sense integrity of the cervical spine. Previous research has demonstrated the CRT demonstrates significant differences between symptomatic and asymptomatic subjects. Impaired kinesthetic awareness in the cervical spine may be associated with degenerative joint disease, chronicity of the complaint, and increased susceptibility to re-injury. The purpose of this study was to determine the intertester and intratester reliability of cervical relocation using the cervical range of motion instrument (CROM) and an affixed laser (AL) device among subjects with and without a history of neck pain. In addition, it was hypothesized that those individuals with a
Methods: A total of 50 asymptomatic subjects with and without a history of neck pain were assigned to two researchers. The CRT was performed for each tester by the subject rotating the head for three trials to the right and left for the CROM and AL.

Results: The results indicate a significant intertester reliability of the CROM (ICC = .717[.502-.839]; .773[.595-.873]) for the subjects in this sample.

Discussion - Conclusions: This study demonstrated that the CROM is a reliable device for measuring cervical relocation between different testers. Future research should investigate if the CRT is predictive of prognosis in patients with cervical pathology.

KEYWORDS: Cervical relocation, CROM, laser.
emphasis on proper breathing techniques during weight lifting. Pain, cervical active range of motion (AROM) and Neck Disability Index (NDI) were assessed at initial evaluation, immediately before and after each treatment, and four weeks after the last treatment session.

**Outcomes:** Improvements in painfree cervical ROM, pain, and disability measured by the NDI exceeded the minimal clinically important difference during treatment and six weeks post treatment. NDI scores at initial evaluation, 2 weeks and 6 weeks post intervention were, 42%, 6%, and 0% respectively.

**Discussion - Conclusions:** This case report describes the clinical reasoning behind the use of trigger point dry needling and activity modification in the treatment of a patient with neck and upper extremity pain. Despite bilateral arm pain, there were no signs of true radiculopathy. The rapid improvement seen in this patient following the initiation of dry needling to the periscapular muscles suggested that these muscles may be a significant source of pain.

**KEYWORDS:** trigger point dry needling (TDN), Cervical Spine, Upper Extremity Pain.
Impairments found at the initial evaluation included decreased knee range of motion (lacking 20° extension; 101° flexion), increased quadriceps guarding and decreased quadriceps muscle activation. The patient completed self-report measures consisting of the Lower Extremity Functional Scale (LEFS), Patient Specific Functional Scale (PSFS), and Numeric Pain Rating Scale (NPRS). Quadriceps muscle activation and force output were measured immediately after receiving a lumbopelvic manipulation using surface EMG during the first follow up session. A multimodal treatment approach was applied consisting of manual therapy, therapeutic exercise, and lumbopelvic joint manipulation. The manipulation was performed on the ipsilateral side of the TKA during the first two weeks of treatment.

**Outcomes:** Voluntary maximal contraction of the quadriceps immediately following a lumbopelvic manipulation at the first follow up session improved (L: 111.6mV to 124.2mV; R: 122.8mV to 127.0mV) based on surface EMG readings. Following 38 treatment sessions over 12 weeks, the patient demonstrated significant improvements in the LEFS by 43 points, the PSFS by 6.6 points and decreased pain to 0/10 on the NPRS. He also demonstrated improved left knee range of motion of 0-2-124°.

**Discussion - Conclusions:** A limitation of this study is that surface EMG testing was only conducted at the first follow up session while the other interventions were provided throughout the plan of care. This case report provides preliminary findings that immediate effects associated with lumbopelvic manipulation may influence quadriceps activation in patients status post TKA. Future studies should consist of a larger sample size and include longer follow up assessments.

**KEYWORDS:** Lumbopelvic manipulation, total knee arthroplasty.

**CONTROL ID:** 2303002
**TITLE:** EVIDENCE-GUIDED PHYSICAL THERAPY FOR A PATIENT WITH A 10-YEAR HISTORY OF CERVICOGENIC HEADACHES: A CASE REPORT
**AUTHORS (LAST NAME, FIRST NAME):** Pulket, Holly; Walton, PT, DPT, FAAOMPT, Cynthia; Fillmore, Maggie; Robertson, PT, DPT, OCS, FAAOMPT, Eric K.
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**ABSTRACT BODY:**
**Background & Purpose:** A cervicogenic headache (HA) has been recognized by the International Headache Society as...
a type of HA that originates from the upper cervical joints and refers symptoms unilaterally into the head and/or face. These HAs affect approximately 20% of adults; they are four times more likely in females versus males. While HAs can be difficult to treat, there is a growing body of evidence to support physical therapy integrating manual therapy interventions, such as mobilization and manipulation to the cervical and thoracic spine and soft tissue treatment, in conjunction with exercise. The purpose of this case study report is to integrate the current best evidence with clinical reasoning to explore the effectiveness of manual physical therapy on a patient with a history of chronic cervicogenic HAs.

**Description:** A 36 y/o female, originally from Spain, presented with a 10-year history of HAs that began following a motor vehicle accident. She was seen in the emergency department in Spain, had imaging to rule out a fracture, and was given pain medication. She did not seek further care until symptoms began to worsen with her most recent pregnancy. Her pain was predominantly on the right side in the suboccipital region radiating to the frontal area, occasionally into the orbital area. Forward head posture and scapular protraction were noted on observation. Cervical active range of motion (ROM) was limited in all ranges; the greatest limitation was ipsilateral cervical rotation. Cerebral arterial dysfunction and upper cervical ligamentous instability testing were negative. Deep neck flexor (DNF) strength was assessed: she was unable to maintain greater than five seconds. Comparable asterisks were produced with right-sided suboccipital muscle palpation and a unilateral C1-2 posterior-to-anterior (P/A) assessment. Manual therapy interventions were directed to the upper cervical region, including P/A mobilization, soft tissue mobilization and stretching for suboccipital and upper trapezius muscles. DNF strengthening via occipito-atlantal nodding and postural strengthening of the middle and lower trapezius muscles were progressed over seven visits.

**Outcomes:** Improvement in ROM was observe. Cervicogenic HA frequency improved from 7-10 HAs per week to 2-3 HAs per week. DNF increased to 30 seconds. The Neck Disability Index improved from 60% to 16%.

**Discussion - Conclusions:** Manual therapy to upper cervical spine plus DNF strengthening and postural exercises may be a beneficial intervention for patients with cervicogenic HAs.

**KEYWORDS:** Cervicogenic, Headache, Cervical.
PAIN AND PARESTHESIA: A CASE REPORT

AUTHORS (LAST NAME, FIRST NAME): Nolan, Timothy J.; Andersen, Adam M.


ABSTRACT BODY:

Background & Purpose: Upper extremity pain is commonly seen in the clinical setting. Differentiating the source of this pain can pose a challenge to the clinician as the differential diagnosis list can range from the spine to the hand. With chronicity, an expansion of symptoms can occur, further hampering the determination of the source of symptoms. The purpose of this case is to describe the differential diagnosis and management of an individual with shoulder pain and five finger paresthesia.

Description: A 52 y/o female presented with a four month history of right (R) shoulder pain with R paresthesia in all five fingers. The shoulder pain and hand paresthesia occurred both in isolation and concurrently. The shoulder and hand symptoms were rated 0/10 at best and 10/10 at worst. Median nerve upper limb neural provocation testing was positive for paresthesia in digits 1-4. Shoulder pain was created with the cervical rotation lateral flexion test and 1st rib passive accessory joint assessment in the caudal direction. Carpal tunnel syndrome (CTS) special tests of Phalen’s, Tinel’s, and carpal compression were positive for numbness in digits 1-4. Joint hypomobility was found at the cervicothoracic spine, 1st rib, and the radiocarpal joint. It was hypothesized her primary diagnoses were thoracic outlet container dysfunction of the 1st rib and CTS. Interventions included non-thrust mobilizations to the 1st rib, carpal bones, and radiocarpal joint, as well as a long sitting cervicothoracic manipulation. In five sessions, cervicothoracic manipulation and 1st rib mobilization resulted in abolishment of shoulder pain and reduction of paresthesia to only digits 2-3. Interventions directed at the wrist (including wrist mobility and strength) for seven more sessions allowed the individual to talk on the phone for 20 minutes without symptoms.

Outcomes: Numeric Pain Rating Scale improved to 0/10 shoulder pain and 2/10 paresthesia. The Upper Extremity Functional Index increased from 37/80 to 75/80. The Boston Carpal Tunnel Questionnaire improved in the severity of symptoms subscale from 2.81 to 1.18 and the functional status subscale from 3.75 to 1.125.

Discussion - Conclusions: This case describes the management of an individual with 1st rib dysfunction and CTS. Manual therapy applied to the 1st rib eliminated shoulder pain, but also reduced paresthesia considered CTS symptomatology. More research is needed to determine the effects of manual therapy to the thoracic container region on
CTS symptoms.

**KEYWORDS:** Differential diagnosis, Upper Extremity Pain, Paresthesia.

**CONTROL ID:** 2317224  
**TITLE:** USE OF SPINAL THRUST MANIPULATION IN A PATIENT WITH URGE URINARY INCONTINENCE: A CASE REPORT  
**AUTHORS (LAST NAME, FIRST NAME):** Comer, Brittany L.; Osborne, Raine; Beneciuk, Jason  
**AUTHORS/INSTITUTIONS:** B.L. Comer, R. Osborne, J. Beneciuk, Brooks Rehabilitation, Jacksonville, Florida, UNITED STATES;  
**ABSTRACT BODY:**  
**Background & Purpose:** Traditional physical therapy interventions for urge urinary incontinence (UUI) include pelvic floor muscle training, behavioral modification, and electrical stimulation. However, the effectiveness of spinal thrust manipulation (STM) has not been extensively reported in the literature for this condition. Therefore, the purpose of this case report is to describe the physical therapy management that included thoracic thrust manipulation for a patient with UUI.

**Description:** A 77 y/o female was referred to physical therapy for urinary incontinence. On initial evaluation, the patient reported primary complaints of increased urinary frequency, urgency, and incontinence episodes, as well as secondary complaints of recurrent intermittent low back pain. Key initial examination findings consisted of limited spinal range of motion, segmental hypomobilities, radicular symptoms, and poor strength and motor control of postural stabilizers (including pelvic floor muscles). Outcome measures were assessed at initial examination, during treatment, and at discharge and consisted of the Incontinence Impact Questionnaire (IIQ-7), a bladder diary (daily urinary frequency and leakage), and modified Oswestry Disability Questionnaire (ODQ). Treatment consisted of a multimodal approach that included traditional UUI interventions in addition to the STM that was initiated two weeks after the start of treatment.

**Outcomes:** Prior to providing STM, the patient reported minimal to no change with traditional interventions (e.g. pelvic floor muscle training and behavioral modification). She was having difficulty adhering to the recommended timed voiding schedule. In the sessions following STM, improvements in time between voids (reduced frequency from an average of 11 voids/day to 7 voids/day), reduced urinary urgency and leakage (an average of 4 times/day to 2 times/day), improved her IIQ-7 score (9.5 points to 0 points), and significantly improved her Oswestry score (20% to 0%).
Improvements continued to progress until discharge after eight weeks of treatment.

**Discussion - Conclusions:** This case report describes the immediate and short term outcomes of using thrust manipulation in the physical therapy management of a patient with UUI. The decision to include STM was primarily based on the clinical rationale influenced by previous research indicating the potential neurophysiological benefits of STM and translation of that evidence to address the identified neurophysiological impairments known to occur with this condition.

**KEYWORDS:** UUI, thoracic spine, manual therapy.

**CONTROL ID:** 2311633

**TITLE:** DIAGNOSIS AND MANAGEMENT OF A PRE-ADOLESCENT FEMALE IRISH DANCER WITH ATYPICAL PLANTAR FOOT PAIN: A CASE REPORT WITH IMAGING VALIDATION OF A FIRST METATARSAL STRESS FRACTURE

**AUTHORS (LAST NAME, FIRST NAME):** Gerke, Dale A.; Brismee, Jean-Michel

**AUTHORS/INSTITUTIONS:** D.A. Gerke, Physical Therapy, Concordia University Wisconsin, Mequon, Wisconsin, UNITED STATES; J. Brismee, Texas Tech University Health Sciences Center, Lubbock, Texas, UNITED STATES;

**ABSTRACT BODY:**

**Background & Purpose:** Irish dancing injuries have been documented for professional dancers including plantar fasciitis and sesamoid fractures. Injuries for the pre-adolescent female Irish Dancer (FID) are not well recognized. The purpose of this case study is to report imaging assisted diagnosis and management of atypical plantar foot pain (PFP) in an 8 year-old FID.

**Description:** The patient presented with chief complaint of diffuse left PFP commencing 12 weeks before initial consultation. Since the plantar foot pain did not diminish, the patient was evaluated by a physical therapist. At the initial evaluation, the patient experienced minimal pain in non-weightbearing (NWB). The pain intensified in weightbearing (WB) escalating with a heel raise, which is a common Irish dance maneuver. The patient experienced pain with resistance of all ankle motions except ankle dorsiflexion. Passive range of motion of the first metatarsophalangeal (MTP) joint was painful with axial loading, dorsal extension, plantarflexion and abduction. Diffuse tenderness with palpation over bony and soft tissue structures in the medial aspect of the foot were noted. There was no tenderness with palpation on the
dorsal side of the foot. The patient was unable to complete single leg dynamic activity on the left foot. There was suspicion for a second metatarsal stress fracture (SF) or tibialis posterior tendinopathy (also common in dancers). Twelve weeks following initial symptoms, radiographs were found to be negative. The patient was treated with immobilization in a walking boot, WB as tolerated and relative rest including cessation of dance. The patient returned for re-evaluation 3.5 weeks after the initial consultation reporting no change in symptoms. Magnetic Resonance Imaging (MRI) was then ordered.

**Outcomes:** Results of the MRI identified two stress fractures in the first MTP. The treatment plan was changed to NWB status with immobilization for an additional six weeks. The patient returned to full WB status and participated in all dance activity 15 weeks after the initial presentation to the physician and 27 weeks after the initial onset of PFP.

**Discussion - Conclusions:** In this pre-adolescent FID, the presentation of PFP can be misinterpreted for a common soft tissue injury. It is important to consider the diagnosis of first MTP SF in a pre-adolescent FID to allow appropriate management. Misdiagnosis or delay in diagnosis may result in an complete fracture if not recognized early.

**KEYWORDS:** Metatarsal, Fracture, Imaging.

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**POSTERS**

**CONTROL ID:** 2308364

**TITLE:** WOULD YOU MOBILIZE THE LUMBAR SPINE OF A PATIENT WITH AN ABDOMINAL AORTIC ANEURYSM?

**AUTHORS (LAST NAME, FIRST NAME):** Sault, Josiah D.; Post, Andrew A.; O'Hearn, Michael

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**ABSTRACT BODY:**
**Background & Purpose:** Occult abdominal aortic aneurysms (AAA) are found in 4-8% of older males. Risk factors
include advancing age, male gender, hypertension (HTN), hyperlipidemia (HL), and smoking. Rupture risk increases with AAA size and smoking. AAAs of <5.5 cm are usually being managed conservatively. Low back pain (LBP) has an increasing incidence with age and can respond to joint mobilization manual therapy (MT). To date, the safety of the application of MT for LBP in the presence of a known AAA has not been reported. This case reports on the pre and post-therapy imaging and short-term effects of MT in a patient with LBP and AAA.

**Description:** A 76 y/o male presented with chronic central LBP and new left (L) groin pain worse with walking or flexion activities such as tying his shoes. Valsalva increased hip pain. However, his pains did not worsen with exertion, bowel/bladder movement, or during/following eating. He denied abdominal or flank pain. He had a diagnosis of a 4.2 cm AAA. He had medically managed HTN and HL and smoked a pack of cigarettes per day. A lumbar magnetic resonance imaging demonstrated an L4/5 lateral-listhesis, an L5/S1 retrolisthesis, and an L5 right lateral compression fracture. Abdominal exam did not elicit back or groin pain; no pulsatile mass was noted. Lumbar extension, L sidebending, and posterior-anterior assessment at L L4/5 reproduced back pain. Groin pain was reproduced with L lumbar rotation or flexion, and hip flexion or internal rotation. A grade III-IV lumbar and hip MT resulted in the resolution of groin pain in the short term and return of ability to tie his shoes.

**Outcomes:** After three visits, he failed to attend further sessions. At three week phone follow-up, he reported that his hip pain had resolved and his back pain could be managed with home exercise. He reported a +6 on the Global Rating of Change. Ultrasound imaging of his AAA 6 months following initial imaging demonstrated expansion of his AAA by 0.1 cm. He did continue to seek medical treatment for his back pain but did not return to physical therapy.

**Discussion - Conclusions:** This case reports on the use of lumbar MT in a patient with a known AAA. Notably, no adverse events were recorded though at 6 month follow-up his AAA had expanded within the expected range. Considering evidence that end range mobilization causes similar displacement to active motion, research into the safety of MT in this population is warranted, as are guidelines for appropriate initial and ongoing clinical screening during treatment in this population.

**KEYWORDS:** abdominal aortic aneurysm, mobilization, imaging.
Background & Purpose: Temporomandibular joint (TMJ) pain is usually associated with nociception from sensory input from the auriculotemporal and masseteric nerves. Sympathetic innervation of the TMJ from the superior cervical ganglia has been described primarily related to joint vasculature, which innervates the face, sweat glands, pupillary dilator muscle, the levator muscle of the upper eyelid, and the lacrimal gland. Nerves of the sympathetic chain run through facial muscles and fascia including the masseter. It is plausible that fibrous constriction could entrap the sympathetic nerves potentially causing symptoms attributable to sympathetic nerve stimulation.

Description: A 67 y/o female presented to physical therapy with a history of chronic bilateral TMJ pain that was frequently associated with “an itching sensation.” Her chief complaint was episodic (bimonthly) intermittent severe TMJ pain associated with a “hot flash” sensation, tingling in bilateral hands, and redness across her face and upper body. The patient was treated for 10 visits addressing impairments with manual therapy, exercise, and education; however, her sympathetic episodes were unchanged. On the 11th visit, the therapist assessed for the first time the intraoral soft tissue of the masseter and performed soft tissue manipulation (STM), which reproduced an immediate response of facial and hand vasodilation and the “hot flash” sensation across her face and upper body.

Outcomes: Patient was seen intermittently for 24 total visits for 4 months. After two sessions (visits 11 & 12) of masseter STM, the patient no longer experienced any symptoms that may have been associated with a sympathetic response. For remaining treatment sessions, the patient was treated for her other symptoms advancing towards a home program. The TMD Disability Index scored improved from 10% disability at initial evaluation to 0% disability at discharge. At two month follow up, patient reported no return of sympathetic symptoms.

Discussion - Conclusions: This case report describes a patient with intermittent episodes of severe discomfort and symptoms that appeared to be related to sympathetic nerve involvement. Reduction in sympathetic symptoms seemed to
be affected by masseter STM given the immediate reproduction of symptoms on visit 11 with intraoral palpation. This case demonstrates an unusual case of a patient with pain and impairments of the TMJ with associated sympathetic symptoms that improved with a manual technique involving pressure inhibition with mandibular movement.

**KEYWORDS:** Temporomandibular Joint, Masseter, Sympathetic Nerve.

**CONTROL ID:** 2315443
**TITLE:** DIFFERENTIAL DIAGNOSIS AND REFERRAL FOR SPONDYLOARTHROPATHY IN A PATIENT WITH NECK AND SHOULDER PAIN

**AUTHORS (LAST NAME, FIRST NAME):** Lonnemann, Paul B.¹; Chaconas, Eric²; Lonnemann, Dr. Margaret E.¹

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**ABSTRACT BODY:**

**Background & Purpose:** Early diagnosis of spondyloarthropathy (SpA) is important to reduce progression or acceleration of the disease process and its complications. The purpose of this case report is to describe the clinical decision making process and screening for medical referral of a patient diagnosed with SpA.

**Description:** A 48 y/o Caucasian male with complaints of neck and bilateral shoulder pain and stiffness presented with progressive loss of mobility and pain over two years duration. The patient’s history and interview revealed red flags and symptom behavior that were inconsistent with mechanical pain. The patient reported pain > 3 months, morning stiffness > 30 minutes, no MOI, chest pain at night, recurrent pneumonia, difficulty swallowing at times and malaise. Initial Neck Disability Index was 26% and revealed sleep disturbance, infrequent headaches and poor concentration. Examination supported that the patient was experiencing a systemic problem versus isolated neck/shoulder impairments. Suspicion of a non-mechanical problem was significantly raised by the hard end feel noted in the cervical and thoracic spines with passive intervertebral motion (PIVM) testing, atypical in a 48 year old male. The findings of PIVM testing led to measurement of chest expansion, which was 1.2 centimeters The therapist utilized the ASAS classification criteria for diagnosis of SpA in the decision making process. The patient was positive for: > 3 months of back pain, age < 45 at onset, HLA-B27+, enthesitis, family history of arthritis, good response to NSAID’s, insidious onset, improvement with exercise
and movement, and pain at night. The patient was referred to a rheumatologist by the physical therapist after initial evaluation.

**Outcomes:** Radiographs after the initial evaluation revealed bony bridging anteriorly at the C3-4 level and nearly complete bridging at the C4-5 and C5-6 levels per radiologist. He was seen for four visits, but was placed on hold due to limited progress and to await rheumatological results. After rheumatological consult and laboratory tests, the patient was diagnosed with HLA-B27+ SpA.

**Discussion - Conclusions:** Physical therapists must conduct a thorough examination to adequately screen for referral. The identification of SpA and subsequent referral was based on history along with passive mobility findings. Physical therapists need to perform a thorough examination and use of a validated classification criteria for SpA to guide referral for early diagnosis and treatment.

**KEYWORDS:** Spondyloarthropathy, Passive Mobility, Neck Pain.

**CONTROL ID:** 2316709
**TITLE:** COMBINED MANUAL THERAPY, EXERCISE AND ACTIVITY MODIFICATION EDUCATION WHEN TREATING A 28 YEAR OLD MALE WITH AN IRREPARABLE ACETABULAR LABRUM AND BILATERAL FEMOROACETABULAR IMPINGEMENT: A CASE REPORT
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**ABSTRACT BODY:**
**Background & Purpose:** It has been argued that conservative hip intervention is potentially correlated with delaying the onset of hip osteoarthritis. Conservative and surgical interventions for acetabular labral tears and femoroacetabular impingement (FAI) have been described; however, a consensus for best outcomes remains elusive. There is a greater lack of knowledge on how to conservatively treat individuals with irreparable labrum injury and FAI. Irreparable labrums can
be associated with persistent hip and groin pain with limited motion. These limitations can result from trauma or from prior labrum resections or repairs without osteochondroplasty.

**Description:** A 28 y/O active male presented with bilateral FAI and a left irreparable labrum diagnosed by his orthopaedic physician based on magnetic resonance arthrogram results, a history of trauma, and prior hip surgery nine years ago. He also presented with a separate report of low back pain associated with a longstanding L4 compression fracture without referred pain. His symptoms progressively became worse over the past two years. He reported worsening bilateral anterior hip symptoms as the day progressed. He would experience sharp transient pain in his left lateral hip with increased gait speed. These symptoms limited prolonged sitting, standing and walking required for his job as a physician assistant. Bilateral hip thrust and non-thrust manual therapy intervention, in addition to exercise and activity modification education, was provided to facilitate recovery.

**Outcomes:** The patient was seen for a total of eight visits over six weeks. Outcome scores were collected using the hip Focus on Therapeutic Outcomes (FOTO). The initial outcome score was 55/100 with an improved discharge score of 67/100. The patient reported diminished symptoms while at work and at the end of the day.

**Discussion - Conclusions:** This case report describes the positive impact of hip manual therapy, exercise and education on symptoms and functional levels in a young male with an irreparable labrum and bilateral FAI. Conservative care could assist patients delay the need for hip revision procedures and contribute to short-term functional gains. However, further investigation into best practice regarding conservative treatment of this population would be beneficial.

**KEYWORDS:** Hip labrum, Manual Therapy, FAI.
Abstract Body: Background & Purpose: An ankle fracture is one of the most common lower extremity fractures, with an increase in annual incidence reported over the last decade. Evidence has been mounting for the support of early active range of motion (ROM) and protected weight bearing versus surgical intervention or immobilization. To date, there is limited and conflicting evidence for manual therapy in treatment of this population. The purpose of this case study is to describe a multimodal impairment-based approach inclusive of manual therapy for treatment of chronic ankle pain from a distal fibular fracture.

Description: A 7 y/o female presented 14 weeks after suffering a distal fibular fracture. Her course of care prior to physical therapy included six weeks of immobilization in a walking boot and protective bracing. Her chief complaint was persistent and chronic dorsal lateral ankle pain rated 10/10 on Numeric Pain Rating Scale (NPRS) during weight bearing activities. She scored a 48/80 on the Lower Extremity Functional Scale (LEFS). During gait observation, limitations from initial contact to terminal stance were noted. Accessory motion testing revealed limitations at the proximal and distal tibiofibular joints and talocrural joint. Strength was 5/5 except for gastrocsoleus and tibialis anterior, which were 4/5, tibialis posterior 4-/5 and peroneals 3+/5. Plantar flexion ROM had an 8° bilateral difference. Dorsiflexion demonstrated aberrant movement towards an inverted position during testing. Interventions included grades 3-4 anterio-to-posterior (A/P) mobilization to the distal tibiofibular joint and a proximal tibiofibular manipulation, which decreased pain to 4/10 on the NPRS with ambulation immediately following the procedure. A fibular taping procedure with A/P spiral technique of distal tibiofibular joint was then applied. On the second visit, she stated 4/10 pain with ambulation. An A/P mobilization was performed to distal tibiofibular joint, with retest of ambulation producing 0/10 pain on the NPRS. The taping procedure was then reapplied and pain free strengthening and balance exercises were performed.

Outcomes: The patient was seen for six visits over four weeks. On discontinuation, the patient presented with unrestricted sport participation, pain rated 0/10 on the NPRS and a LEFS score of 80/80.

Discussion - Conclusions: A multimodal treatment approach emphasizing impairment-based manual therapy including
manipulation may be beneficial in the treatment of chronic ankle pain in an pediatric female post fibular fracture.

**KEYWORDS:** MANUAL, IMPAIRMENT, PEDIATRIC.

**CONTROL ID:** 2317341
**TITLE:** ORTHOPEDIC MANUAL PHYSICAL THERAPY POST TEMPOROMANDIBULAR JOINT GAP ARTHROPLASTY AND BILATERAL CORONOIDECTOMY: A CASE REPORT
**AUTHORS (LAST NAME, FIRST NAME):** Bux, Christopher J.\(^1\); Sault, Josiah D.\(^1\); Duncombe, Alison\(^1\); Emerson-Kavchak, Alicia\(^1\)
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**ABSTRACT BODY:**
**Background & Purpose:** Ankylosis is the most common cause of temporomandibular joint (TMJ) dysfunction in children; trauma is the etiological factor in over 80% of cases. Traumatic childhood TMJ ankylosis may impair airway access, mastication, speech, and facial symmetry. When TMJ dysfunction limits essential functions of life, surgery may be warranted. As reankylosing of the TMJ is common, a total joint replacement (TJR) may be recommended despite its high rate of failure. Reankylosis has been linked to inadequate physical therapy (PT). Orthopedic manual physical therapy (OMPT) in postoperative TMJ management is not well studied. The purpose of this case is to describe the clinical decision making and outcomes in treating a patient using OMPT following a complex corrective surgery for TMJ ankylosis.

**Description:** A 36 y/o female presented to PT following bilateral coronoidectomy and a right (R) gap arthroplasty for TMJ ankylosis from fractures caused by childhood abuse. Pre-surgical max incisor opening (MIO) was 3 mm, resulting in an ability to eat solid foods or breathe deeply with strenuous activity. Her intraoperative MIO was 25 mm; however, her post-surgical prognosis was poor and her surgeon anticipated a future R TJR. She reported bilateral resting and clenching facial pain (P1), worse on the R, reaching 6 and 8/10 respectively on the Numeric Pain Rating Scale; episodic bilateral tinnitus, aching suboccipital pain (P2), and submandibular pain along her incision (P3). On initial examination, she demonstrated MIO to 12 mm and lateral deviation of 1 mm bilaterally. Central posterior-to-anterior passive accessory
motion testing at C2 reproduced P2 & P3, but not P1. Intra-oral assessment was not possible due to MIO; however, caudal, anterior, and medial TMJ motions were hypomobile with extra-oral assessment bilaterally. She was treated with extra-oral caudal, anterior, and medial TMJ mobilizations for six sessions.

**Outcomes:** Rest and clenching pain both resolved. The TMJ disability index improved from 20/120 to 0/120. The Tampa Scale of Kinesiophobia (TMD) improved from 47/72 to 26/72. Her MIO improved to 31 mm and lateral deviation to 3 mm bilaterally, exceeding intraoperative MIO. She ate steak for the first time in her life and is no longer a candidate for TJR. The Global Rating of Change was +7.

**Discussion - Conclusions:** This case details successful post-operative OMPT management of a patient following a complex surgery for TMJ ankylosis. Further research to establish proper post-operative PT care is warranted.

**KEYWORDS:** Temporomandibular Dysfunction, Ankylosis, Post Operative.
with R TMJ subluxation, 10 mm left and 13 mm R lateral excursion. Hypomobility at the R atlantoaxial (AA) and occipitoatlantal (OA) joints were noted (both 2/6 Paris scale). She was unable to sustain deep neck flexor (DNF) activation for 10 seconds over five repetitions. The Neck Disability Index (NDI) was 24% disabled. The treatments included manual and device assisted (through the use of a piece of rubber tubing between the teeth and upper lip) stretching. The patient used the device in her upper lip two hours daily for 12 weeks. Additional interventions included AA & OA cervical thrust manipulation, TMJ tracking exercises, DNF training and patient education on eating, chewing and posture.

**Outcomes:** The outcomes of the patient were favorable after six treatment sessions over 12 weeks to address the upper lip coverage over her upper teeth. She demonstrated 42 mm opening without R TMJ subluxation, 10 mm left and R lateral excursion. Joint mobility of the cervical spine was normalized (3/6 Paris scale). She was able to sustain DNF activation for 10 seconds over 10 repetitions. NDI improved to 6% disabled. She reported 0/10 pain in her TMJ or teeth.

**Discussion - Conclusions:** The upper lip morphed into a lengthened position through device assisted stretching, thus a shortened length was hypothesized to be a contributing cause of her chronic TMJ pain. The upper cervical thrust manipulation restored normal upper cervical arthrokinematics and was likely attributed to HA resolution. There was no direct manual treatment to the TMJ, yet this patient improved in her objective findings and symptoms. A comprehensive approach greatly benefited this patient. Further research is needed to examine the effect of upper lip length may have on patients presenting with TMJ dysfunction.

**KEYWORDS:** Temporomandibular Joint, Cervicogenic headaches, Temporomandibular Dysfunction.
ABSTRACT BODY:

Background & Purpose: The greatest predictor of future cancer risk is a prior history of cancer. The incidence of male breast cancer is low and even less is known about metastatic disease. Physical therapists evaluate and treat patients with acute back pain and a history of cancer. This case illustrates clinical reasoning in the management of a male patient with lower back pain and a history of breast cancer.

Description: A 66 y/o male was referred with acute onset of right lower back pain. Medical history included a left mastectomy the prior year. During physical examination, lumbar active range of motion flexion and extension were limited to 25%, with flexion reproducing symptoms. Passive accessory intervertebral movement testing reproduced symptoms with central and right unilateral posterior-to-anterior glide at L2, L4 and L5, suggesting mechanical lower back pain. Passive range of motion of the hips was stiff but pain free. With an extension-based program and manual therapy to the spine, the lumbar symptoms reduced but new groin symptoms emerged. The patient’s groin symptoms were now reproduced with flexion, internal rotation and flexion-adduction of the hip. Manual interventions to the femoroacetabular joint were performed without a change in symptoms, prompting the therapist to refer the patient back to his primary care physician for hip x-rays. As the groin symptoms progressed, the therapist continued to advocate for the patient to obtain further magnetic resonance imaging (MRI) of the lumbar spine.

Outcomes: After three physical therapy visits, the patient reported a reduction in the Numerical Pain Rating Scale from 6/10 to 0/10, lumbar range of motion improved to 50% and FOTO score increased seven points. Despite improvement in primary symptoms, new groin pain emerged that did not respond to intervention. Radiographs were negative for hip osteoarthritis. A lumbar MRI was ordered as groin symptoms progressed and showed metastatic disease at L2 and L5. Full body bone scan showed proximal right femur lytic lesion. The patient had an intramedullary pin placed in the right femur to stabilize the area.

Discussion - Conclusions: When diagnosed with breast cancer, males tend to have larger tumors and higher disease staging, possibly due to later detection. These factors and little information on rates of metastases produce elevated concern regarding non-musculoskeletal disease. This case demonstrates the importance of vigilance in tracking symptoms in a high-risk patient even as function improves.

KEYWORDS: LOW BACK PAIN, BREAST CANCER, CLINICAL REASONING.
CONTROL ID: 2316610
TITLE: EVIDENCE BASED PRACTICE IN THE DIAGNOSIS AND CLINICAL DECISION MAKING FOR PHYSICAL THERAPY INTERVENTIONS IN A PATIENT WITH CERVICAL RADICULOPATHY: A CASE STUDY
AUTHORS (LAST NAME, FIRST NAME): Oberhoffer, Sara M.1; Smith, Janelle2; Barbieri, Jocile2; Farrell, Kevin1; Levsen, Mark1
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ABSTRACT BODY:
Background & Purpose: Cervical radiculopathy can present in a variety of ways. Literature for determining appropriate physical therapy (PT) intervention has been outlined, but outcomes from implementation are lacking in current evidence. The purpose of this case study was to demonstrate the application of evidence based practice (EBP) utilizing a non- validated Clinical Prediction Rule (CPR), neck pain Clinical Practice Guidelines (CPG) and other current best evidence to guide clinical decisions regarding interventions for an individual with left (L) side cervical radiculopathy.

Description: A 28 y/o male with chief complaints of neck pain lasting four weeks and had progressed to constant lateral L upper extremity pain, atrophy, weakness, sensory changes, inability to lie flat, and 10 pound weight lost in one month. Key objective findings were limited L cervical rotation active range of motion (AROM) to 45°, extension AROM of 40° which exacerbated arm pain, positive distraction test, positive base upper limb tension test (ULTT), multi-myotomal weakness, diminished sensation in L C6 distribution, atrophy in L supraspinous fossa, and FOTO score of 54% functional. Serious pathology was considered, but he was deemed appropriate for PT. Objective findings fit a CPR for cervical radiculopathy thus literature was examined and best evidence including neck pain CPG were used to guide treatment. Patient attended seven visits over four weeks with simultaneous pharmaceutical intervention.

Outcomes: Upon discharge the patient denied any pain, but mild strength impairments persisted. His rotation AROM improved to 70° bilaterally, and extension AROM improved to 50° degrees symptom free. L shoulder strength improved to 4+/5 or 5/5, sensation was fully intact, and base ULTT was negative. His FOTO score improved to 85% function.
Discussion - Conclusions: This case study demonstrates the importance and benefit of applying EBP to implement proper interventions for cervical radiculopathy. This patient fit the diagnostic criteria outlined in a CPR for cervical radiculopathy. Decision making for treatment interventions was guided by applying the neck pain CPG and current best evidence, resulting in significant improvements in pain and function. This documents the practical benefits and outcomes of the use of the CPR and CPG for cervical radiculopathy.

KEYWORDS: Cervical Radiculopathy, Clinical Practice Guideline, Clinical Prediction Rule.

CONTROL ID: 2328812
TITLE: THE ROLE OF MANUAL PHYSICAL THERAPY IN THE DIAGNOSIS & MANAGEMENT OF FEMORAL ACETABULAR IMPINGEMENT: A CASE REPORT
AUTHORS (LAST NAME, FIRST NAME): Himler, Peer¹; Rodeghero , Jason ¹
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ABSTRACT BODY: Background & Purpose: Femoral acetabular impingement (FAI) in the form of either proximal femoral neck (cam) or acetabular rim (pincer) abnormalities can result from traumatic hip injury. These pathologies are recognized as a potential source of pain and disability in patients following a hip injury. FAI may lead to early onset of hip degeneration or articular cartilage damage (labrum). FAI is a common problem that has only recently been recognized and diagnosed in patients with primary hip complaints. This case report demonstrates the role of a manual physical therapist in the examination, diagnosis, and treatment of FAI.

Description: A 34 y/o male marathon runner sustained a long axis trauma to his left (L) hip during a motor vehicle collision. This resulted in immediate groin and posterior trochanteric pain during any running activity. A physician diagnosed him with gluteal tendinopathy and L FAI following magnetic resonance imaging and referred him to physical therapy (PT). The examination findings included: hypomobility of the ipsilateral lumbar spine, positive L hip FADIR,
FABER, and hip scour testing. Manual muscle testing revealed L gluteal medius & maximus to be 3+/5. Hypomobility in the hip joint motion was noted in flexion, internal and external rotation. The patient was treated for eight visits with a regional interdependence approach to address these impairments. Treatments consisted of mobilization with movement techniques to the hip, manual resisted neuromuscular hip facilitation, progressive hip girdle strengthening, lumbar spine manipulation, and a graded return to running. A test-retest approach was used to measure the effectiveness of treatment interventions on his comparable signs.

**Outcomes:** The patient experienced a full resolution of symptoms following PT. He achieved full L hip motion, normal strength, and had no functional impairments/limitations. The FOTO Functional Status survey increased 67% during his treatment and was maintained at six month follow up. The Lower Extremity Functional Scale improved to 72/80. Global Rating of Change was +7. The patient reporting feeling 100% recovered at the time of discharge. He was able to run without pain or difficulty and completed a full marathon within one month since discharge.

**Discussion - Conclusions:** This case demonstrates the valuable role of a manual physical therapist in the diagnosis and treatment of FAI. Hip pain and limitations from FAI in patients after a trauma may be treated successfully by a manual physical therapist using a multimodal approach.

**KEYWORDS:** Femoral acetabular impingement , Manual therapy, mobilization with movement.
Prolonged disabling foot pain and limited ankle/foot range of motion (ROM) may persist after immobilization. Considering the navicular’s role in maintaining the medial longitudinal arch and gait biomechanics, a multi-modal physical therapy (PT) approach is critical in achieving optimal function. To date, evidence to support the role of PT in this population is limited. The purpose of this case study is to describe a multi-modal approach including manual therapy, therapeutic exercises (TE) and neuromuscular re-education (NMR) in management of a patient with a healed navicular fracture.

**Description:** A 34 y/o female, 3-months post closed navicular fracture, had been medically managed conservatively. Chief complaints included limited ankle dorsiflexion (DF) to neutral and planterflexion (PF) to 20°. She reported 3/10 pain at rest and 8/10 pain with walking two blocks on the Numeric Pain Rating Scale (NPRS). Baseline Lower Extremity Function Scale (LEFS) was 39/80. Single leg stance time (SLS) was four seconds. Interventions included thrust and non-thrust manipulations to talocrural and proximal tibia-fibula joints. TE and NMR were included to maintain and enhance ROM gains and joint proprioception retraining.

**Outcomes:** The patient attended 11 PT sessions over six weeks. At discharge, ankle ROM was increased to that of unaffected extremity (DF=10° and PF=55°). NPRS improved to 0/10 at rest and with walking greater than 15 minutes at 2.0-2.5 miles per hour on treadmill. LEFS improved to 78/80. SLS increased to greater than 30 seconds. She was able to complete 20 single heel raises with minimal discomfort.

**Discussion - Conclusions:** Patients presenting with deficits in ankle/foot ROM and limited function post navicular fracture can benefit from a multi-modal PT approach.

**KEYWORDS:** navicular fracture, multi-modal, manual therapy.

**CONTROL ID:** 2303005
**TITLE:** TREATMENT OF MEDIAL ELBOW PAIN AND COLD ALLODYNIA USING A REGIONAL INTERDEPENDENCE MANUAL THERAPY APPROACH
**AUTHORS (LAST NAME, FIRST NAME):** Villarin, Jason J.¹; Vo, Truong M.¹
**AUTHORS/INSTITUTIONS:** J.J. Villarin, T.M. Vo, Kaiser Hayward Physical Therapy Fellowship in Advanced Orthopedic Manual Therapy, Union City, California, UNITED STATES;

**ABSTRACT BODY:**

**Background & Purpose:** Medial elbow pain frequently has a referral diagnosis of medial epicondylitis or elbow sprain. The ulnar nerve may be a primary or contributory source of pain or other less common complaints such as cold allodynia, due to entrapment, altered neural tension, or neuritis. The 1972 double crush principle has since evolved into the concept of regional interdependence with a proposed link between cervical and distal sources of peripheral pain. When signs and symptoms suggest peripheral nerve irritation, an effective approach to altered neurodynamics benefits from a treatment progression that responds to emerging data from multiple potential entrapment locations.

**Description:** An active 62 y/o female jewelry maker and gardener presented with over a year of recalcitrant medial elbow pain and elbow cold allodynia, with pain reported in response to a gentle cool breeze. History included ipsilateral shoulder strain five years prior while walking her dog, resulting in several months of anterior shoulder pain. This was diagnosed as a sprain by her doctor and was treated with rest. The current symptoms began gradually, without motor or distal sensory deficits. Manual therapy intervention focused on soft tissue mobilization, upper extremity neural glides, passive accessory and physiological mobilization at the wrist, elbow and shoulder, and cervical spine. Treatment began peripherally at the elbow and shoulder, with a distinct palpable ulnar nerve and taut surrounding tissues. When latent ache followed the 3rd session, attention was turned to the cervical spine. Progress plateaued after several sessions of cervical spine mobilizations, treatment returned to the periphery including the wrist, elbow, and shoulder.

**Outcomes:** The patient reported complete relief from cold allodynia after manual therapy treatments at the cervical spine. She was able to run and sleep without a warm knitted sleeve on her elbow. Altered neural tension was tracked using upper limb neurodynamic test-1, which improved immediately after treatments and demonstrated progressive carryover. She was able to push up from the garden ground with wrist extension. Quick DASH score improved from 79.5% to 36%, meeting the minimal clinically important difference.

**Discussion - Conclusions:** This case illustrates a manual therapy focused treatment progression with multiple interdependent treatment sites in a patient with a unique presentation of cold allodynia.

**KEYWORDS:** manual therapy, allodynia, regional interdependence.
Background & Purpose: Anterior knee pain is a common musculoskeletal complaint; 25-40% of all knee pain seen in sports medicine centers can be attributed to patellofemoral pain syndrome (PFPS). PFPS is often explained to be secondary to biomechanical and anatomical risk factors; however, emerging evidence indicates a neurophysiological component to chronic PFPS, which has been theorized to affect pain and function. With unknown etiology and controversy concerning the exact definition of PFPS, diagnosis and management can be difficult. Currently, there is limited evidence for the use of orthopedic manual physical therapy (OMPT) in those with chronic PFPS. Therefore, the purpose of this case report is to describe the effects of OMPT in the successful treatment of an individual with chronic PFPS as it relates to pain, function and central processing of pain.

Description: A 28 y/o female reported chronic non-specific anterior knee pain. She met the common diagnostic criteria for PFPS; however, she demonstrated no increase in pain with passive accessory mobility testing at the patellofemoral joint. Tibiofemoral anterior-posterior (AP) translation reproduced her pain and was subsequently used for treatment as tibiofemoral joint kinematics directly affect the patellofemoral joint. Due to the presence of anterior knee allodynia and decreased pressure pain threshold (PPT), there was also suspicion for central sensitization. Treatment consisted of high dosed, oscillatory tibiofemoral anterior-posterior mobilizations supplemented with a home exercise program for therapeutic exercise and balance training.

Outcomes: The patient was treated for eight sessions over the course of eight weeks. Outcome measures were administered pre and post treatment. She improved on the Anterior Knee Pain Scale (Kujala), Numeric Pain Rating Scale, Global Rating of Change (each met minimal clinically important difference); Fear Avoidance Belief Questionnaire (6/24
to 2/24 PA, 31/42 to 5/42 W), PPT (119 to 386 kPa) and Step Down Test (11 to 40 steps). At two month follow up, the patient was satisfied with her current state and continued to have improvement in functional activity.

Discussion - Conclusions: This case supports the use of OMPT in the treatment of chronic non-specific anterior knee pain. While there is paucity in the literature concerning the use of local OMPT for chronic PFPS, it should be strongly considered as this case highlights the positive effects on both immediate and long term pain, function, and central processing.

KEYWORDS: anterior knee pain, pressure pain threshold, manual therapy.
was found. R foot passive classical midfoot supination and pronation were pain-free, but supination was limited more than pronation. Bilateral and unilateral heel rise showed decreased R mid-foot supination. The patient completed three treatments over two weeks. Treatment included cuboid manipulation, stretching and eccentric loading of the calf muscles based on Alfredson protocol, weight-bearing neuromuscular re-education of the mid-foot, and gluteus maximus muscle strengthening.

**Outcomes:** Symptoms resolved after three treatments and patient was able to run three miles pain free. Improvements exceeded the minimal clinically important difference on all outcome measures: Foot And Ankle Ability Meausre (FAAM)- Activities of Daily Living (58% to 100%), FAAM-Sports (9% to 90%). the Lower Extremity Functional Scale improved (58% to 97%), and NPRS (9/10 to 0/10).

**Discussion - Conclusions:** AT has been shown to be related to overpronation of the mid-foot. If the cuboid is stuck in internal rotation throughout the gait cycle, this could result in excessive rear-foot pronation transmitted through the calcaneocuboid joint. In this case, immediately after the delivery of cuboid manipulation, the patient reported complete relief of symptoms. Careful assessment and successful treatment of a hypomobile cuboid can significantly change the biomechanics of the foot and the lower kinetic chain, eliminate pain and improve patient’s function.

**KEYWORDS:** Achilles tendinopathy, Cuboid syndrome.

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**CONTROL ID:** 2315503
**TITLE:** CLINICAL DECISION MAKING FOR TREATMENT OF CHRONIC PAIN IN LEFT UPPER ABDOMINAL AREA: A CASE REPORT
**AUTHORS (LAST NAME, FIRST NAME):** Barclay, Martin1; Farrell, Kevin1; Dickman, Scott2; Levsen, Mark1
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**ABSTRACT BODY:**
**Background & Purpose:** Presently, there is little literature about the treatment of chronic abdominal symptoms outside
of sports medicine arena. Physical therapists do not often treat these patients because a somatic origin is not frequently considered. The purpose of this case report is to describe the clinical decision making and differential process based on spinal level innervation to treat a male with chronic upper left (L) abdominal symptoms with intervention directed to the spine.

**Description:** A 36 y/o male was referred by a primary care physician to physical therapy with a 10 month insidious onset of localized L upper abdominal pain. Symptoms included a constant, annoying pain in the L upper abdominal wall, worsened with prolonged sitting and abdominal resistance. Endoscopy and CT examinations of the GI tract were negative. The patient's previous past medical and surgical histories were unremarkable. L upper abdominal pain was reproduced with sitting for longer than 20 minutes and with slump testing bilaterally. He spent most of his work day sitting at a desk or in a car, which exacerbated his symptoms. Although he exercised 4-6 days/week, he had to stop flexion biased abdominal resistance exercises six months prior due to pain. Compression or traction of the spine did not change his symptoms. His L upper abdomen was mildly tender to palpation. Abdominal strength testing increased his pain; trunk extension and L rotation relieved his pain. Central and L unilateral posterior-to-anterior glides were hypomobile from T7-12. L sided rib rotation glides and thoracic extension mobilization (targeting T7-T11) were administered during six treatment sessions over 26 days. After each session, the patient reported being able to sit for longer periods with less symptoms. Other interventions included stretching, taping, and patient education to avoid prolonged thoracic flexion positions.

**Outcomes:** The patient’s improved to tolerating sitting for over three hours before an increase in pain. Slump testing was negative bilaterally. Subjective pain decreased from 6/10 to 2/10 at discharge. Two months after discharge, the patient reported pain 0/10 throughout most of the day, and 2/10 with sitting over three hours.

**Discussion - Conclusions:** This case supports directing treatment at corresponding spinal levels of related symptoms for a painful dysfunction. It emphasizes the clinical decision making and differentiation with treatment directed at the L sided thoracic spine to address abdominal pain resulting in functional improvements.

**KEYWORDS:** abdominal, thoracic, pain.
ABSTRACT BODY:
Background & Purpose: Juvenile idiopathic arthritis (JIA) is the most common rheumatic disease among children and is an important cause of short term and long-term disability in childhood. Prolonged arthritis to the joint can produce pain and limitations in range of motion (ROM) and can lead to bone over growth and subsequent limb length discrepancies. Little research exists concerning physical therapy management and no evidence concerning orthopedic manual physical therapy (OMPT) is currently available. Therefore, the purpose of this case report is to describe the effects of the use of OMPT in combination with therapeutic exercise in the successful treatment of a child with oligoarticular JIA.

Description: A 6 y/o girl with oligoarticular JIA presented with elbow pain and stiffness limiting functional ROM. Limitations in body structure, function and participation affected the patient’s quality of life and led to increased concern from her parents. With respect for child’s fear level and careful collaboration with the child’s mother, both passive physiological ROM and passive accessory joint mobility were found to be painful and hypomobile resulting in limitations in both flexion and extension ROM at the elbow. Treatment consisted of OMPT (joint mobilization, soft tissue mobilization, passive ROM) in combination with therapeutic exercise and a home exercise program.

Outcomes: The child was seen for nine sessions over the course of eleven weeks. She demonstrated improvements in elbow ROM, pain as measured by the Wong-Baker Faces Pain Scale (WBFPS), Childhood Health Assessment Questionnaire (C-HAQ), Pediatric Outcomes Data Collection Instrument (PODCI), and the Patient Specific Functional Scale (PSFS). At discharge, the child was pain-free and had improved participation in ADLs and recreational activities despite having a residual limitation in her elbow extension ROM. At two month follow up, the mother reported that both child and parents were satisfied with the child’s current status and continued improvement in functional activity with full return to gym class and recreational activities.
Discussion - Conclusions: The findings of this case report highlight the positive effects of OMPT in conjunction with therapeutic exercise on pain, activity and participation along with the challenges of regaining ROM in a young child with oligoarticular JIA. While there is paucity of evidence concerning the use of OMPT for JIA, it may be considered as a treatment option for children with JIA on an individual basis.

KEYWORDS: elbow pain, juvenile idiopathic arthritis, manual therapy.
Symptoms were consistent with a dysfunction of the upper thoracic spine similar to T4 syndrome.

**Outcomes:** Thrust manipulation to the thoracic spine at T4 was utilized at the evaluation. An immediate improvement in cervical and shoulder range of motion and decrease in UE paresthesias were noted. The patient was treated with thoracic spine thrust manipulation, self-mobilization and posture exercises. She was discharged after nine sessions with Neck Disability Index of 5%, a Global Rating of Change +7 (a very great deal better), and a reported 95% increase in overall functional levels.

**Discussion - Conclusions:** Thrust manipulation, away from the site of spinal encroachment, may have produced a mechanical and/or neurophysiological effect on the sympathetic chain in the thoracic spine. Alternately, manipulation to the thoracic spine may have increased spinal mobility decreasing spinal cord compression. This case suggests the importance of clinical reasoning to determine the source of symptoms in patients diagnosed with CSM. This case cannot be generalized to the entire population with CSM and the use of manipulation in those with CSM should be used with caution.

**KEYWORDS:** Myelopathy, Thoracic, Manipulation.

**CONTROL ID:** 2319500

**TITLE:** A COMBINATION OF MANUAL THERAPY, MOVEMENT SYSTEMS, AND BIOPSYCHOSOCIAL APPROACHES FOR THE TREATMENT OF UPPER EXTREMITY ADVERSE NEURAL TISSUE TENSION: A CASE REPORT

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**ABSTRACT BODY:**

**Background & Purpose:** Peripheral nerve injuries can result from a multitude of causes including trauma, poor posture, and altered movement patterns. Adverse neural tension is a possible consequence of the insult to the nervous system.
Dysfunction due to the adverse neural tension is often accompanied by fear avoidance behaviors. The purpose of this case report is to demonstrate the use of manual therapy, movement systems, and biopsychosocial approaches in the physical therapy treatment of a patient who sustained an occupational upper extremity injury, which resulted in adverse neural tissue tension of multiple peripheral nerves.

**Description:** A 40 y/o female right (R) hand dominant warehouse worker sustained an injury to the R 2nd metacarpophalangeal (MCP) joint. The extent of the injury included soft tissue and bone damage. At evaluation, the patient reported 7/10 pain at rest and 9/10 pain (on the Numeric Pain Rating Scale - NPRS) with movement of the 2nd MCP. The Fear Avoidance Beliefs Questionnaire (FABQ) work subscale was 17/42 (FABQ-W); 15/24 on the physical activities subscale (FABQ-PA). The QuickDASH findings were 22% disability due to symptoms and 75% disability with work-related tasks. Impairments included joint hypomobility, decreased muscle function, decreased active range of motion (AROM) of the R 2nd MCP and radiocarpal joints. The upper limb neural tension tests (ULTT) were positive for the radial, median, and ulnar nerves. She demonstrated allodynia in the R radial nerve distribution. The patient's grip strength was 32 pounds on the left; she was unable to perform this on the R due to pain. The patient was treated six times over two weeks with manual therapy to the spine and R upper extremity, neuromuscular reeducation exercise, neural tension techniques and patient education via the biopsychosocial model.

**Outcomes:** After discharge, the NPRS improved to 0/10 pain with rest and activity. The FABQ-W improved to 10/42; the FABQ-PA improved to 3/24. The QuickDASH improved to 9% symptom related disability and 0% disability with work-related tasks. R 2nd MCP and radiocarpal AROM equaled the left. The patient denied allodynia. The radial, median, and ulnar ULTTs were negative. Her R grip strength increased to 34 pounds.

**Discussion - Conclusions:** Interventions of joint manipulations, neuromuscular reeducation using the movement systems approach, and concepts focused on the biopsychosocial approach were determined to be an integral combination in the patient's successful return to full work-related duties.

**KEYWORDS:** Manual Therapy, Movement System, Biopsychosocial model.
**Background & Purpose:** Proximal hamstring tears are found in the young, athletic population. While clinical recommendations have been published on the treatment of such injuries, little literature exists on the management of older individuals with chronic hamstring tears. This case describes the addition of a neuromobilization intervention in the management of an individual with a chronic, proximal hamstring tear.

**Description:** A 60 y/o female presented with a 12-month insidious onset of right (R) ischial tuberosity pain. Her pain worsened to 8/10 with hill walking, stair ascent, and sitting. MRI findings revealed a 10 mm retracted proximal hamstring tendon tear. Initially, passive Straight Leg Raise (SLR) test measured 70° compared to 85° on the left and produced a posterior thigh “stretching” with mild buttock pain. This didn’t change with hip internal rotation (IR), adduction, or ankle dorsiflexion (DF). The tear was identified as the primary pain generator by painful and reduced hamstring strength/flexibility. Nonthrust hip joint mobilizations, eccentric strengthening, and hamstring stretching were utilized for 7 visits. Pain free posterior thigh stretching occurred during seated hamstring stretching. Due to minimal change on the Lower Extremity Functional Scale (LEFS), continued pain, and passive SLR findings, passive cervical flexion (hip IR/adduction, ankle DF) was tested Visit 8. This increased her buttock pain. Neuromobilizations using cervical flexion with hip flexion, IR, and adduction in varying positions were utilized for 6 additional sessions with hamstring eccentric strengthening/stretching; hip mobilizations were discontinued after Visit 7.

**Outcomes:** From Visits 1-8, her worst pain reduced from 8/10 to 4/10. Her Global Rating of Change (GRoC) was +2 (A little bit better); LEFS from 51/80 to 53/80. With the addition of neuromobilizations, her worst pain = 1/10, GRoC = +6 (A great deal better), & LEFS = 67/80. Her initial R hamstring MMT of 3+/5 with pain reproduction improved to pain
Discussion - Conclusions: Lack of improvement with hip mobilizations, stretching, and strengthening led to reconsideration of a neurodynamic component to the pain. This non-irritable, chronic, proximal hamstring tear required extensive sensitizing maneuvers during neural provocation testing to fully reproduce the patient’s symptoms resulting in a positive outcome with neuromobilizations.

KEYWORDS: Neuromobilization, Neurodynamics, Hamstring
touching her shoulder such as putting on a sweater or holding a baby. Light brushing of the painful area consistently reproduced her symptoms indicating dynamic tactile allodynia. While she demonstrated impairments in shoulder, cervical and thoracic range of motion, her symptoms were not consistently reproduced with these motions or associated joint accessory motion assessment. Cervical joint mobilizations were applied over a 10-week course of care. Shoulder mobilization; cervical, rotator cuff, and scapular strengthening exercises; and postural correction training were also implemented.

**Outcomes:** Within-session measurements of pain intensity and area of allodynia were taken during four sessions in which cervical mobilizations were the primary intervention, resulting in immediate improvements. NPRS scores for spontaneous pain decreased from 5.5/10 to 0.5/10 and allodynia pain decreased from 8/10 to 0.5/10. The cross-sectional area of allodynia decreased from 107.3 cm² to 9.8 cm². At discharge, the patient reported a Global Rating of Change score of +6 or “a great deal better.”

**Discussion - Conclusions:** Cervical joint mobilizations were effective in reducing PHN related pain and allodynia in this patient. Physiologically this may be related to the effect of manual therapy on centrally sensitized pain. Further investigation should be conducted to determine efficacy of manual therapy as a viable, low-risk treatment option for PHN.

**KEYWORDS:** post-herpetic neuralgia, allodynia, Joint mobilization.
**Background & Purpose:** Biopsychological risk factors for chronic include pain related fear, catastrophization and poor coping strategies such as avoidance of physical activities. The Fear Avoidance Model of Musculoskeletal Pain describes how a sub-group of acute low back pain (LBP) sufferers can develop chronic pain. The patients' cognitions and beliefs regarding their pain facilitates emotional and behavioral responses that can lead to pain nociception changes, motor control deficits and disuse syndrome. This, in turn, can lead to a cycle of pain and diminished activity participation. Information patients obtain from medical professionals often influence these beliefs. Physical therapists need to assess for maladaptive beliefs and integrate these findings into their clinical reasoning and interventions strategies. In addition to an active treatment approach, the literature supports the use of Therapeutic Neuroscience Education (TNE) to address inappropriate beliefs, reduce fear of movement and provide the reconceptualization needed for a patient to actively participate in the rehabilitation process. The purpose of this case study is to apply the evidence regarding TNE and progressive stabilization exercises in a patient with LBP who demonstrated biopsychosocial risk factors.

**Description:** A 29 y/o female with a two year history of LBP and back related leg pain reported that the pain evoked an emotional response of anxiety and fear. This was followed by prolonged rest and activity avoidance. An MRI revealed degenerative changes; the patient interpreted these findings to be very threatening. Initial Fear Avoidance Beliefs (FABQ-A) score was 23/24. Physical examination revealed motor control deficits, guarded movements and trunk weakness. Treatment included TNE, education to minimize the relevance of imaging findings, and progressive stabilization exercises. Patient was seen for 20 visits over 4 months.

**Outcomes:** Outcome measured included the FABQ, Oswestry Disability Index (ODI) and the SF-12x2 Health Survey. After one year the FABQ-A reduced to 2/24. The ODI improved from 46% to 4%. Significant changes were observed in the SF 12X2.

**Discussion - Conclusions:** Three out of five prognostic factors for chronic low back pain are biopsychosocial in nature. Mounting evidence suggests that physical therapists need to identify patients with these risk factors and modify treatments accordingly to include pain education and active coping strategies. This case study lends further support to this evidence.

**KEYWORDS:** Biopsychosocial, Neuroscience, Stabilization.
**CONTROL ID:** 2302290  
**TITLE:** MANUAL THERAPY IN TREATMENT OF ACUTE THORACIC PAIN IN A PATIENT WITH PRIOR MULTI-LEVEL THORACOLUMBAR FUSION: A CASE REPORT  
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**ABSTRACT BODY:**  
**Background & Purpose:** Patients with prior spinal fusion often seek physical therapy for treatment of acute pain and disability years after the procedure. While manipulation is supported in the literature, patients with a history of surgery are excluded from most studies. This case describes a multi-modal approach using orthopedic manual therapy (OMT) including thrust manipulation, dry needling, and specific exercise in treatment of a patient with a prior T4-L2 posterior spinal fusion for progressive idiopathic scoliosis.  

**Description:** A 25 y/o patient presented to clinic seven days after an insidious onset of thoracic pain six years post-thoracolumbar fusion. Her chief complaint was left lower thoracic and lumbar pain with bilateral upper thoracic and shoulder pain. Initial safety precautions included red flag assessment, neurological screening, study of radiographs and review of surgical report. Prior to OMT treatment, manual assessment included patient response to palpation and mobility testing. OMT techniques included supine rib manipulation, cervicothoracic (CT) thrust manipulation, lumbosacral manipulation, and dry needling to CT musculature. Joint mobility and movement patterns were reassessed immediately after OMT techniques. Exercise activities included cranio-cervical flexion training, lower cervical extension training, and lumbosacral and scapulothoracic strengthening. Patient education was provided in return to ADLs and recreational activities.  

**Outcomes:** The patient was seen for five visits with a decrease in Numeric Pain Rating Scale from 7/10 to 2/10. The Oswestry Disability Index decreased from 28% to 14%. An increase in chest wall expansion from 1.5 to 2 inches was demonstrated. Pain and disability levels remained low at two month follow up and the patient was able to return to running distance races.  

**Discussion - Conclusions:** Patients following multi-level fusion can benefit from manipulation as part of a multi-modal approach targeting segments adjacent and regional to the prior surgical fusion. In this case, manipulation played a significant role in the return of this patient to high levels of function.
**KEYWORDS:** Fusion, Manipulation.

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**CONTROL ID:** 2308671  
**TITLE:** THE USE OF MANIPULATION AND MOVEMENT SYSTEM IMPAIRMENT-BASED EXERCISE IN THE TREATMENT OF CERVICAL RADICULOPATHY: A CASE STUDY  
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**ABSTRACT BODY:**

**Background & Purpose:** The Movement System Impairment (MSI) Syndromes by Shirley Sahrmann are well-known diagnostic categories used to diagnose and treat the cause and contributing factors of musculoskeletal dysfunctions. Scapular movement dysfunctions have been cited to cause excessive stresses in the cervical spine. According to the APTA Current Practice Guidelines, conservative management of cervical radiculopathy consists of thoracic manipulation, cervical traction and nerve glides; however, these treatments do not address the underlying movement dysfunctions that cause the pathology. The purpose of this case study is to discuss the addition of MSI exercise to evidence-based treatment of cervical radiculopathy.

**Description:** A 37 y/o male complaining of neck pain radiating into left upper extremity demonstrated paresthesia and weakness in C7 nerve root distribution. Symptoms were reproduced with left cervical rotation, Spurling’s test and radial nerve upper limb neural tension test (ULNTT), and improved with distraction. The patient met the MSI diagnosis of scapular depression syndrome with insufficient upward rotation. Scapular depression is defined as a posture with observed increased downward slope of the shoulder, scapula positioning not between T2-T7, horizontal clavicles, and increased resting arm length. Insufficient upward rotation is most evident during active shoulder flexion and the inferior scapular angle does not reach mid-axillary line in patients with this syndrome. Interventions included thrust and non-thrust manipulation to the cervical and thoracic spine, as well as motor MSI-based motor control exercises focusing on the serratus anterior and upper trapezius to address scapular positioning and motions.
Outcomes: Neck Disability Index (NDI) score was 54% at initial evaluation. Following 6 weeks of treatment, the NDI score improved to 4%. Grip strength, ULNTT, and cervical range of motion were normalized. Additionally, motor control to achieve proper scapular positioning improved. Video and photographic data were taken pre- and post-treatment to visualize scapular positioning, showing improved slope of left shoulder.

Discussion - Conclusions: MSI diagnostic categories may be useful in the identification of underlying movement dysfunctions contributing to the development of cervical radiculopathy.

KEYWORDS: Cervical radiculopathy, Movement System Impairment Syndromes, Manipulation.

CONTROL ID: 2326090
TITLE: THE SIDE, DURATION AND NUMBER OF CAVITATION SOUNDS DURING THRUST MANIPULATION TO THE LUMBAR SPINE
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ABSTRACT BODY:

Background & Purpose: The primary purpose of the study was to determine which side of the spine cavitates during rotatory high-velocity low-amplitude (HVLA) thrust manipulation directed to the L5-S1 articulation in side lying. Secondary aims were to calculate the average number of pops, the duration of lumbar thrust manipulation, and the duration of a single cavitation.

Methods: Thirty-six asymptomatic participants received two lumbar HVLA thrust manipulations targeting the right and
left L5-S1 articulation, respectively. Two high sampling rate accelerometers were secured bilaterally 25 mm lateral to the midline of the L5-S1 interspace. The accelerometers were connected to a data acquisition system for collecting the sounds produced within the human body. For each manipulation, two audio signals were extracted and singularly processed via spectrogram calculation. The signals were then integrated in the frequency domain to obtain the release of energy over time on each side of the lumbar junction.

**Results:** Cavitation sounds were detected unilaterally in 98% of the lumbar HVLA thrust manipulations [Z1]. The mean number of audible pops per lumbar HVLA thrust manipulation was 5.27 (range 2-7). The mean duration of a single manipulation was 139.13 ms (90% CI: 5.61ms, 321.49ms) and the mean duration of a single audible pop was 2.69 ms (90% CI: 0.95, 4.38).

**Discussion - Conclusions:** Cavitation was significantly more likely to occur unilaterally than bilaterally during side-lying lumbar HVLA thrust manipulation. Most subjects produced 5 pops during a single rotatory HVLA thrust manipulation targeting the right or left L5-S1 articulation; therefore, practitioners of spinal manipulative therapy should expect multiple popping sounds when performing HVLA thrust manipulation to the lumbar spine. Furthermore, the traditional manual therapy approach of targeting a single ipsilateral or contralateral facet joint during the delivery HVLA thrust manipulation appears unrealistic.

**KEYWORDS:** Spinal Manipulation, Lumbar, Cavitation.
ABSTRACT BODY:
Background & Purpose: Dry needling therapy (DNT) has been a topic of much interest in recent literature. Thus far, it has primarily been discussed for the use of treating soft tissue restrictions and myofascial pain. There is paucity in the literature in regards to dry needling for other uses, specifically for the use of improving contractility of targeted musculature.

Description: A 21 y/o male reported to the clinic for treatment of “foot drop” and shin pain, which he had developed following a dental procedure that required a tibial bone graft. Following an unsuccessful bout of physical therapy consisting primarily of lower limb strengthening, the patient underwent a peroneal nerve decompression procedure. At the time of initial evaluation for the episode of care being discussed, the patient was nine months status post decompression surgery. He presented with dorsiflexion weakness (4-/5 manual muscle test (MMT)) and an inability to contract the great toe extensors (0/5 MMT). The initial three treatment sessions consisted of lower limb strengthening, taping of the proximal fibular head, surface neuromuscular electric stimulation of the dorsiflexors and toe extensors, and manipulation of the lumbar spine in an effort to utilize the neurophysiological response to promote improved muscular activation. No objective improvements were noted following the initial three sessions. In the fourth session, DNT was targeted at the extensor hallicus longus (EHL). A twitch response was elicited and intramuscular stimulation (IMS) was applied and successfully produced repeated contractions of the EHL. This intervention was repeated at the 5th visit as well.

Outcomes: Immediately following the initial application of DNT coupled with IMS, the patient tested at a 4-/5 MMT for isolated great toe extension. He demonstrated 35° of active great toe extension in supine. These results carried over fully to the next visit and the patient reported a substantial decrease in anterior shin fatigue with walking. No additional objective gains were made when the intervention was performed again at the next visit, but results did carryover until his last treatment session, seven weeks later.

Discussion - Conclusions: This case report suggests that DNT may not only be useful for the purpose of pain relief, but may also play a role in improving contractility of inhibited muscle groups, even in the setting of peripheral nerve injuries. Further research should be done to assess the efficacy of using DNT and IMS for the purpose of improved muscle contractility.

KEYWORDS: Dry needling, Nerve injury, Muscle contractility.
Background & Purpose: Temporomandibular disorder (TMD) is a major cause of pain. The prevalence of TMD is between 5-60% of the population, with high rates of dysfunction reported. A correlation has been proposed to exist between cervical spine dysfunction and TMD. The referral of the upper cervical spine to the jaw is theorized to be due to convergence of afferent input from distinct areas in the head and neck. A reciprocal dose response relationship between neck and jaw pain has also been shown. This case report describes the successful management of a patient with chronic TMD with emphasis on treatment of the upper cervical spine.

Description: A 35 y/o female homemaker presented with an insidious onset of 2.5 year severe left sided jaw pain and disability after multiple failed dental and medical interventions. Due to her pain, she was only able to sleep for 30 minutes at a time and was eating a soft diet. Past medical history included smoking and an acute episode of hypertension. Upon evaluation, the patient demonstrated upper cervical flexion to 75% of normal, mouth opening to 25 mm, left lateral deviation to 8 mm, hypomobility at CO-C1-C2, and forward head posture. Unilateral posterior-to-anterior accessory motion assessment at C0/1 reproduced her jaw pain. Her cervical flexion rotation test was restricted. Allodynia and irritability precluded jaw mobility assessment on day one. Over the first four sessions, she demonstrated rapid improvement with mouth opening and pain relief with treatment directed solely at the cervical spine. Subsequent visits were used to improve motor control with mouth opening and TMJ mobility.

Outcomes: The patient was seen for ten visits over the course of three months. Her jaw pain on the Numeric Pain Rating Scale improved from 9/10 to 0/10 with clenching and mouth opening. Mouth opening improved to 61 mm and left lateral deviation to 18 mm. The Jaw Pain and Function Questionnaire improved from 38/52 to 7/52. She scored +6 (a great deal better) on the Global Rating of Change at discharge. She returned to a normalized diet and sleeping patterns.

Discussion - Conclusions: Manual therapy directed at the upper cervical spine in a patient with chronic TMD resulted in
significant changes in pain and function within the first four visits. This case study demonstrates the importance of clinical reasoning in the assessment and treatment of patients with chronic TMD.

**KEYWORDS:** Manual Therapy, Cervical Spine, TMD.

**CONTROL ID:** 2311444
**TITLE:** TREATMENT OF A PATIENT WITH CERVICAL RADICULOPATHY USING EMPLOYER-PROVIDED ONSITE HEALTH AND WELLNESS SERVICES IN CONJUNCTION WITH MANUAL PHYSICAL THERAPY
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**ABSTRACT BODY:**
**Purpose:** In the face of ever-rising healthcare costs, many employers have begun to offer a range of onsite health and wellness services. Evidence suggests a positive return on investment for large employers with reductions in medical and absenteeism-related costs for every dollar spent on wellness programs. Successful employee wellness programs also facilitate increased employee participation and adoption of healthy lifestyle changes. This case study illustrates the use of employer-provided, onsite physical therapy with other health and wellness services for successful treatment of a patient with cervical radiculopathy.

**Description:** A 37 y/o male employee of a large Silicon Valley-based tech firm was referred to physical therapy by an on-site physician for complaints of right shoulder pain, tingling of right index finger, aching of lateral forearm, and neck stiffness. Symptoms were aggravated by sitting at his workspace, lifting weights, and rock climbing. Physical examination revealed diminished sensation of the second digit, immediate reproduction of shoulder symptoms with cervical extension, and pain and stiffness with accessory mobility assessment of C4-C6. Patient Specific Functional Scale (PSFS) score at initial evaluation was 5/30. Treatment consisted of seven onsite visits, over two months, including manual physical therapy, home exercises, and a group class for posture. Additionally, the patient received an onsite ergonomic evaluation and five massage sessions addressing soft tissue lesions of the cervical spine and right scapula. Available wellness services also consisted of an ergonomics lab where he could demo workstation equipment,
chiropractic care, personal training, and fitness classes. At discharge, he was asymptomatic with sustained cervical extension and regained normal sensation of second digit. PSFS at discharge was 28/30.

Summary of Use: Onsite health and wellness programs benefit employers by decreasing health-related costs and improving productivity and employee retention. Employees benefit by improved access to services, improved ability to manage time, and decreased transportation costs. This patient demonstrated improvements in both objective and subjective measures, including full return to prior level of function by utilizing multiple onsite wellness services for the treatment of his condition.

KEYWORDS: radiculopathy, employee wellness.

CONTROL ID: 2319399
TITLE: THE NEUROPHYSIOLOGICAL, BIOCHEMICAL AND MECHANICAL MECHANISMS UNDERPINNING THE USE OF DRY NEEDLING BY PHYSICAL THERAPISTS
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ABSTRACT BODY:
Theory/Body: Theory: There are a number of neurophysiological, biochemical, and mechanical theories from literature published by MDs, DOs, PTs and LACs underpinning the anti-nociceptive and anti-inflammatory effects of DN.

Body: Although a number of high-quality trials have demonstrated successful outcomes following the insertion of dry needles targeting neural, muscular and/or connective tissues in a variety of neuromusculoskeletal conditions, several PT state boards have confined DN to the insertion of muscular trigger points (TrPs). Eliciting localized twitch responses may help reduce Ach and normalize factors of pain/inflammation associated with TrPs. However, the localization of TrPs by palpation has yet to be validated, suggesting that the mechanism responsible for DN analgesia may be more complicated.
DN activates opioid-based pain reduction, mediated by endogenous cannabinoids and the SNS, and non-opioid pain relief via 5HT and NE from the brain stem. DN also triggers the HPA-axis centrally and the CRH-POMC-corticosteroid axis locally to inhibit cox-2, reducing inflammatory cytokines. Recent studies demonstrate that needle insertion combined with mechanical and/or electric stimulation reverses PKC mediated peripheral hyperalgesic priming by normalizing nociceptive channels, to include TRPV, ASIC, TTX and P2X/Y.

Electro-needling (EN) stimulates immune cells, fibroblasts (FB) and keratinocytes to release CGRP and substance-P, altering CGRP stimulation of TTX receptors to reverse hyperalgesia. It also encourages the supraoptic n. to release oxytocin to quiet ASIC receptors peripherally and stimulate opioid interneurons (IN) spinally. Moreover, EN inhibits ERK1/2 kinase pathways of inflammation in the spinal cord and stimulates Aδ fibers and N/OFQ to reverse C-fiber mediated central changes.

Mechanotransduction (MT) of FBs and peripheral nerves via TRPV1 and P2X/Y-mediated intercellular ca²⁺ wave propagation and subsequent activation of the n. accumbens, inhibits spinal pain transmission via glycinergic and opioidergic INs. The increased ATP is metabolized to adenosine, which activates P1 purinergic receptors, events considered key to DN analgesia and rho kinase-based tissue remodeling. MT-mediated release of histamine further explains analgesia secondary to needling points distal to pain.

**Conclusion:** DN analgesia is dependent on a number of synergistic physiologic events involving biochemical and mechanical processes in neural, connective and muscle tissue.

**KEYWORDS:** dry needling.
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ABSTRACT BODY:
Background & Purpose: Unicompartmental or Bicompartmental Knee Arthroplasty (UKA/BKA) has been increasingly used as an alternative to Total Knee Arthroplasty (TKA). Though the UKA/BKA has several advantages, it has recently been shown to have higher revision rates than primary TKA, with one reason due to post-operative instability. The purpose of this case report is to describe the role of the orthopedic manual physical therapist (PT) in the management of a patient with instability following BKA.

Description: Outpatient physical therapy began one month post operatively. Initial treatment involved a regional, impairment-based approach, including joint mobilization, scar and soft tissue mobilization for range of motion, as well as progressive strengthening and functional training. Despite gains in range of motion and strength, by visit 5 the patient complained of unsteadiness and painful clicking with gait, leading to further examination, which revealed frontal plane instability. Strengthening in weight bearing was progressed as tolerated over visits 6-10, incorporating a progression of dynamic stabilization with manual cues to address the issue of structural and functional instability. Between visits 5-10, the PT also repeatedly communicated with, and served a consultative role between the patient and her surgeon to identify and manage the instability, which inevitably resulted in evaluation for revision.

Outcomes: At visit 10 improvements included ambulation and stair mobility without assistive device, full knee range of motion, and Lower Extremity Functional Score increased from 25/80 to 50/80. Despite these gains, the patient continued to complain of pain and unsteadiness with prolonged weight bearing activities.

Discussion - Conclusions: Post-operative instability is an adverse outcome following BKA and revisions are frequently performed. This case report demonstrated the role of the orthopedic manual PT in the identification of this adverse surgical outcome. Further, the patient-centered approach to post-operative care through manual therapy following BKA, musculoskeletal clinical reasoning, and communication to the health team resulted in the ability to improve function without immediate surgical intervention. Physical therapy care can extend beyond addressing impairments and include consultative roles, such as helping the patients to address concerns they may not feel confident in approaching with their
**CONTROL ID:** 2315342  
**TITLE:** WHEN KNEE PAIN IS NOT JUST KNEE PAIN: DIFFERENTIAL DIAGNOSIS OF SPINE-RELATED LOWER EXTREMITY PAIN: A CASE REPORT  
**AUTHORS (LAST NAME, FIRST NAME):** Schauerte, Christine S.¹; Mischke, John J.¹  

**ABSTRACT BODY:**  
**Background & Purpose:** In the last 20 years, prevalence of knee pain has risen substantially. Rates of total knee replacement (TKR) have more than doubled without a parallel rise in radiographic knee osteoarthritis (OA). Recently, a study described 34% of TKRs as “inappropriate,” and nearly one third of those who undergo TKR fail to gain relief. Coexisting lumbar spine dysfunction may partly explain this failure. In fact, up to 89% of patients with knee OA awaiting TKR have moderate or severe lumbar spondylosis. Yet, few studies discuss the lumbar spine as a source of isolated knee pain, and little evidence exists to support the use of spinal manual therapy (MT) in patients with knee pain.  

**Description:** A 68 y/o female with hypertension and asthma presented with left posteromedial knee pain. Examination revealed: pain (7/10 at worst); antalgic gait; difficulty with stairs, squats, and single leg balance; hamstring (HS) weakness (3+/5 with pain); patellofemoral and tibiofemoral hypomobility; and knee range of motion (ROM) of 0-14°-110°. Verbal screening of the lumbar spine for pain was negative. Findings consistent with knee OA included weight bearing pain, morning stiffness, crepitus, impaired function and restricted ROM. Interventions included exercise, gait training (she refused recommend cane) and MT directed at the knee. Moderate progress was achieved over 8 visits followed by a plateau. At this institution, if knee pain is not resolved by physical therapy (PT), referral to orthopedic surgery is made. However, reassessment revealed lumbar ROM deficits, pain reproduction with left extension quadrant and unilateral posterior-anterior pressure at L5/S1, and positive neural provocation tests. Spinal MT immediately improved knee extension ROM, gait quality, and HS strength (4+/5).
Outcomes: Six additional sessions focused on spinal MT resulted in improvement at discharge to: pain (4/10 at worst), knee ROM of 0-3º-115º, pain free gait, negative neural provocation tests, HS strength (4+/5), Lower Extremity Functional Scale (36/80 to 52/80), and Global Rating of Change score of +7.

Discussion - Conclusions: Failure to recognize spinal contribution to lower extremity (LE) symptoms lessens the effectiveness of PT, limiting patients’ function and quality of life. Thorough lumbar spine screening, even in the absence of lumbar pain, will lead to wider recognition of spine-related LE pain and could improve PT outcomes, thereby reducing the number of patients referred for potentially unnecessary interventions, such as injections or surgery.

KEYWORDS: knee pain, manual therapy, spine-related lower extremity pain.

CONTROL ID: 2315495
TITLE: A MANUAL THERAPY APPROACH TO TREATMENT OF STEROID-INDUCED METATARSALGIA CAPSULITIS: A CASE REPORT

AUTHORS (LAST NAME, FIRST NAME): Gutierrez, Mark¹; Lang, Caitlyn¹
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ABSTRACT BODY: Background & Purpose: Kenalog is a commonly injected steroid used in orthopedic medicine practice with muscular atrophy a known side effect. In cases of metatarsalgia capsulitis, intrinsic foot strength is vital for recovery. Conservative management of metatarsalgia capsulitis consists of shoe wear modification and exercise. The purpose of this case study is to discuss the addition of thrust and non-thrust manual therapy to contributing regions to decrease stresses on the 2nd metatarsal head in a recreational runner.

Description: A 40 y/o female recreational runner complained of left 2nd metatarsal pain and numbness following Kenalog injection 2 months prior. Patient symptoms were reproduced with plantar-dorsal glide of 2nd metatarsal head and superficial peroneal nerve biased straight leg raise test. Visible skin discoloration and atrophy noted in affected area.
Joint dysfunctions of 2nd TMT and talocrural joints were considered chief deficits, along with adverse neural tissue tension. The patient was treated with thrust and non-thrust manipulation and intrinsic foot strengthening.

**Outcomes:** The Lower Extremity Functional Scale (LEFS) score at initial evaluation was 48/80. Following eight weeks of treatment, the LEFS score improved to 70/80. Neural provocation testing was negative and patient was able to resume running.

**Discussion - Conclusions:** Thrust and non-thrust manipulation may be a beneficial addition to augment treatment in the management of metatarsalgia capsulitis.

**KEYWORDS:** manual therapy, metatarsalgia capsulitis.

**CONTROL ID:** 2326079
**TITLE:** THE SIDE, DURATION AND NUMBER OF CAVITATION SOUNDS DURING CERVICO THORACIC JUNCTION THRUST MANIPULATION
**AUTHORS (LAST NAME, FIRST NAME):** Dunning, James²; Mourad, Firas¹; Zingoni, Andrea³; Iorio, Raffaele⁴; Perreault, Thomas⁶; Rosa, Riccardo⁵
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**ABSTRACT BODY:**
**Background & Purpose:** No study has previously investigated the side, duration and the number of audible popping sounds during high-velocity low-amplitude (HVLA) thrust manipulation to the cervicothoracic junction. The primary purpose was to determine which side of the spine cavitates during cervicothoracic junction HVLA thrust manipulation. Secondary aims were to calculate the average number of pops, the duration of cervicothoracic thrust manipulation, and
the duration of a single cavitation.

**Methods:** Thirty-eight patients with upper trapezius myalgia received two cervicothoracic HVLA thrust manipulations targeting the right and left T1-2 articulation, respectively. Two high sampling rate accelerometers were secured bilaterally 25 mm lateral to the midline of the T1-T2 interspace. The accelerometers were connected to a data acquisition system for collecting the sounds produced within the human body. For each manipulation, two audio signals were extracted and singularly processed via spectrogram calculation. The signals were then integrated in the frequency domain to obtain the release of energy over time on each side of the cervicothoracic junction.

**Results:** The cavitation sounds were detected contralateral to the short-lever applicator of the manipulative physiotherapist in 91% of the cervicothoracic HVLA thrust manipulations. The mean number of audible pops per cervicothoracic HVLA thrust manipulation was 4.35 (90% CI: 3.14, 5.22). The mean duration of a single manipulation was 60.77 ms (90% CI: 33.47, 83.20) and the mean duration of a single audible pop was 4.13 ms (90% CI: 0.95, 7.15).

**Discussion - Conclusions:** Cavitation was significantly more likely to occur unilaterally, and contralateral to the applicator contact, during cervicothoracic HVLA thrust manipulation. Most subjects produced 3–5 pops during a single lateral break HVLA thrust manipulation targeting the right or left T1-T2 articulation; therefore, practitioners of spinal manipulative therapy should expect multiple popping sounds when performing HVLA thrust manipulation to the cervicothoracic junction. Furthermore, the traditional manual therapy approach of targeting a single ipsilateral or contralateral facet joint during the delivery HVLA thrust manipulation may not be realistic.

**KEYWORDS:** Spinal Manipulation, Cervicothoracic, Cavitation.

**CONTROL ID:** 2301736
**TITLE:** TREATMENT OF AXILLARY WEB SYNDROME USING INTRUMENT ASSISTED SOFT TISSUE MOBILIZATION AND THORACIC MANIPULATION: A CASE REPORT
**AUTHORS (LAST NAME, FIRST NAME):** Crane, Patricia A.
**AUTHORS/INSTITUTIONS:** P.A. Crane, MossRehab, Philadelphia, Pennsylvania, UNITED STATES;
**ABSTRACT BODY:**

**Background & Purpose:** Axillary web syndrome (AWS), a common disorder found following axillary lymph node dissection, often results in reduced shoulder range of motion (ROM), pain and functional limitations. AWS is treated typically with stretching and soft tissue mobilization. To this author's knowledge, there is no research published examining thoracic manipulation and instrument assisted soft tissue mobilization (IASTM) in the treatment of AWS. The purpose is to describe a regional manual therapy approach in the treatment of AWS using IASTM and thoracic manipulation.

**Description:** A 49 y/o female presented to physical therapy 8 months following axillary node dissection, bilateral mastectomy, and latissimus dorsi transfer reconstruction with complaints of an inability to reach overhead and an inability to resume running. At the initial examination, she reported 5/10 pain on Numeric Pain Rating Scale (NPRS), right shoulder active ROM limited to 150° of abduction and 140° of flexion. Thoracic rotation ROM was limited to 25% bilaterally. Upon palpation, there was a band of fibrotic tissue that spanned from the axilla to the proximal 1/3 of the humerus. Thoracic segmental posterior-to-anterior intervertebral mobility testing revealed hypomobility T4-T7. The initial Patient Specific Functional Scale (PSFS) was 6.3 for activity limitations of lifting, running and turning.

The patient was seen for four visits over four weeks. No treatment was rendered on the evaluation date due to insurance limitations. The patient was treated with IASTM to the axilla for two visits to address soft tissue limitations/axillary cording. Limitations in thoracic rotation ROM were treated with thoracic distraction manipulation, with moderate improvement in thoracic rotation. On Visit 4 a thoracolumbar junction rotation manipulation resolved the painfully limited rotation. Manual therapy was followed by shoulder girdle strengthening and thoracic stretching. A HEP was issued.

**Outcomes:** Pain reduced to 1/10 on NPRS, meeting the minimal clinically important difference. Active ROM improved for shoulder abduction (174°) and abduction (178°) and full thoracic rotation. PSFS ratings improved to 9 and the patient was able to resume running three miles daily without pain.

**Discussion - Conclusions:** A regional manual therapy approach to AWS with the inclusion of IASTM may be beneficial to decrease pain, improve ROM, and increase function following axillary node dissection, mastectomy, and reconstruction.
KEYWORDS: Axillary Band syndrome, Thoracic Manipulation, Breast Cancer.

CONTROL ID: 2302636
TITLE: THE USE OF MANUAL THERAPY TO ASSESS THE PAIN GENERATOR OF CHRONIC MEDIAL SCAPULA PAIN IN A PATIENT FOLLOWING ROTATOR CUFF REPAIR.
AUTHORS (LAST NAME, FIRST NAME): Blankenship, Ayna A.; Robertson, Eric
AUTHORS/INSTITUTIONS: A.A. Blankenship, E. Robertson, Physical Therapy, Kaiser Permanente, Benicia, California, UNITED STATES;
ABSTRACT BODY:
Background & Purpose: This study describes the use of manual therapy to assess and treat the cervical spine and shoulder in a patient with the primary complaint of medial scapula pain one year following a rotator cuff (RC) repair. Medial scapula pain can have multiple causes including altered mechanics of the RC or scapula and/or referral from the mid cervical discogenic/facet complex. Similar to patients with chronic RC dysfunction, those who have undergone RC repair may present with contributory cervical pain generators.

Description: A 42 y/o female with complaints of left (L) scapular and anterior shoulder pain that had persisted despite RC repair one year prior. At the initial visit, the patient was observed to have mild forward head posture and shoulder hiking with L shoulder elevation. Scapular dyskinesis was observed during shoulder flexion and abduction active range of motion (AROM). The anterior shoulder pain increased with shoulder AROM, but her medial scapula pain remained unchanged during shoulder assessment. The medial scapula pain increased with ipsilateral cervical rotation. She presented with hypomobility and associated pain with unilateral passive accessory intervertebral movement (PAIVM) at L C4/5 & C5/6. Treatment consisted of soft tissue mobilization of the cervical paraspinals followed by unilateral PAIVMs at the hypomobile segments. The patient’s cervical rotation AROM improved and medial scapula pain decreased by 25% during the first visit. While subsequent treatments addressed shoulder impairments and scapular weakness, each session ended with mobilization of the cervical spine with increasing grades of movement.

Outcomes: Scapular and shoulder pain, cervical and shoulder mobility and strength improved each treatment and over the subsequent visits. Mobilization of the patient's cervical spine effectively decreased the medial scapular pain, allowing her to tolerate progressive RC and scapular strengthening. By visit 12, the patient demonstrated L shoulder AROM &
strength within functional limits and normalized scapular movement without winging. Her Patient Specific Functional Scale improved from 2.33 at initial visit to 10 at discharge. She had returned to her prior level of function and was weaned off pain medication.

**Discussion - Conclusions:** In order for the patient to attain relief of scapular symptoms and return to prior level of function, contributory pain generators from the cervical spine should not be overlooked.

**KEYWORDS:** scapula pain, cervical facet, rotator cuff.

**CONTROL ID:** 2313350

**TITLE:** INTEGRATION OF A VISUAL, VESTIBULAR AND MANUAL THERAPY APPROACH FOR POST-CONCUSSIVE SYNDROME IN A MALE SOCCER PLAYER: A CASE STUDY

**AUTHORS (LAST NAME, FIRST NAME):** Semlow, Kathryn A.¹; Courtney, Carol A.²

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**ABSTRACT BODY:**

**Background & Purpose:** Concussion, a neurological insult triggered by a biomechanical trauma to the brain, results in sequelae such as headache, dizziness and lack of concentration. Its incidence is estimated to be as high as 3.8 million annually, accounting for 5-13% of all reported sports injuries in high-school-aged athletes. Symptoms generally resolve within 21 days, with the majority resolving in seven to 10 days. Currently there is emerging evidence that adolescents may have poorer outcomes after concussions. The current recommendations for treatment involve physical and cognitive rest, with a gradual return to play protocol. The purpose of this case study was to describe signs and symptoms of post-concussion syndrome in a high-school male soccer player and to illustrate the integration of a visual/vestibular and manual therapy based treatment approach.

**Description:** A 13 y/o male soccer player sustained a concussion during a game and presented to physical therapy four weeks post-injury with persistent symptoms of headaches, difficulty concentrating, dizziness, sleep disturbance and depression. At initial evaluation the patient's score on the Rivermead Post Concussion Symptoms Questionnaire was
RPQ-3 of 6/12 and RPQ-13 of 25/52, implicating a moderate impact on participation, psychosocial functioning and lifestyle. The patient presented with decreased and painful cervical mobility, atypical saccade movement, reduced VOR gain, convergency insufficiency, and balance deficits. The patient was treated in physical therapy using a variety of visual, vestibular and cervical manual therapy techniques.

**Outcomes:** The patient was seen for 12 visits over six weeks. At discharge, he reported complete resolution of headaches, depression and light-sensitivity, improvement with concentration in school and sleeping. The patient had full, pain-free cervical mobility, normal saccades, VOR and convergence testing, and significant improvement with balance. Improved score of RPQ-3 of 1/12 and RPQ-13 of 3/52 were reported. The patient was cleared by his physician to return to non-contact sport participation with a gradual return to play.

**Discussion - Conclusions:** Guidelines developed for adult athletes may not necessarily translate to best clinical practice in children and adolescence. In this case study the integration of a visual, vestibular and cervical manual therapy treatment approach led to a significant reduction in the patient's symptoms, as well as an overall improvement in function at school, home and socially.

**KEYWORDS:** POST-CONCUSSION, VISUAL/VESTIBULAR TRAINING, CERVICAL SPINE MOBILIZATIONS.
developing shoulder pain. The use of examination procedures to identify specific tissue involvement in painful conditions is a critical element in musculoskeletal physical therapy practice. Physical therapists can benefit from this approach to patient examination because it allows them to focus treatments on the specific causes of symptoms. The purpose of this case study is to describe a systematic approach to examination and treatment of shoulder pain through the identification of specific pain generators.

**Description:** The patient presented in this case had a five month onset of right anterolateral shoulder pain. She had pain with resisted shoulder abduction (mild) and pain with resisted shoulder internal rotation (moderate). The following special tests were positive for pain provocation: Hawkins-Kennedy Test, Neer Test, and Coracoid Impingement Test. In addition the Pull Test was performed where by painful resisted shoulder abduction is repeated while the therapist maintains caudal distraction of the humerus. Diminished pain is an indication of a lesion of the subacromial-subdeltoid bursa. Based on the examination findings the physical therapy treatment diagnosis was subscapularis tendinopathy with subacromial bursitis. Initial treatment focused on symptom control and consisted of transverse friction massage to the subscapularis insertion followed by passive stretching and concluded with bursal mobilization technique for management of symptoms related to subacromial bursitis. The final phase consisted of scapular stabilization activities and eccentric subscapularis exercise.

**Outcomes:** The primary functional outcome measured used for this patient was the Shoulder Pain and Disability Index (SPADI). At the time of the initial examination her score was 60/130. At discharge her score was 10/130. Her overall improvement on the SPADI was 83.3%.

**Discussion - Conclusions:** This case suggests that using a tissue specific examination and treatment approach may be beneficial in achieving a successful outcome in the treatment of patients with painful subscapularis tendinopathy.

**KEYWORDS:** rotator cuff, tendinopathy, subscapularis.
MANIPULATION, SPECIFIC EXERCISES AND A BIOPSYCHOSOCIAL TREATMENT APPROACH: A CASE REPORT

AUTHORS (LAST NAME, FIRST NAME): Boyer, Ashley1; Pratt, Lucas1

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ABSTRACT BODY:

Background & Purpose: Manual therapy techniques for the spine have been found to be successful in relieving spinal joint dysfunction and pain; however, there is a lack of clinical evidence to support the effectiveness of manual therapy for the treatment of acute neural irritation of the upper extremity. While addressing fear avoidance beliefs (FABs) with a Fear Avoidance Belief Questionnaire (FABQ) have been found to be an effective tool to screen patients with low back pain in return to work prognosis, there is a lack of clinical evidence for utilizing the FABQ in extremity pain. The purpose of this case study is to examine the effectiveness of joint manipulation, specific exercises for posture improvement and a biopsychosocial treatment approach for an occupationally-injured patient with 1st digit ulnar collateral ligament injury and concomitant adverse neural tension (ANT).

Description: A 26 y/o female fast food Crew Leader was involved in a work injury three days prior to evaluation, resulting into right arm/hand pain, inabilities to raise her arm or to grip items. At evaluation, the patient presented with 5/10 shoulder and 1st digit pain on the Numerical Pain Rating Scale (NPRS), neural extremity irritation, and significantly high FABs and disability. The patient was treated six times over a two-week period. Impairments of joint mobility, muscle function, and posture were identified. The treatment included joint mobilizations proximally to the subcranial, cervical, and thoracic spine, and distally to the wrist and elbow joints; neuromuscular training to the deep cervical neck flexors and posture education. Biopsychosocial aspects of empowerment of her rehabilitation and cognitive strategies for deemphasizing focus on pain and symptoms and altering her maladaptive pain responses were included.

Outcomes: At the time of discharge, significant improvement was noted on the NPRS (5/10 to 0/10); FABQ physical activity subset (18/24 to 0/24) and work subset (25/42 to 11/42); the Patient Specific Functional Scale (PSFS: lifting 3/10 to 9/10, reaching 4/10 to 9/10, gripping 2/10 to 9/10); and the Upper Extremity Functional Index (50% ability to 95% ability).

Discussion - Conclusions: The results of this case study indicated positive outcomes from a physical therapy model based on manual therapy techniques and biopsychosocial approaches. She reported decreased FABs and disabilities while
eliminating her pain. Further research is needed to establish the FABQ as an effective tool in screening and treatment of extremity pain.

**KEYWORDS:** Joint manipulation, Neural tension, Fear Avoidance.

**CONTROL ID:** 2316395  
**TITLE:** MANAGING AN INDIVIDUAL WITH REPORTS OF POSITIONAL SADDLE REGION PARASTHESIAS AND FECAL INCONTINENCE UTILIZING A MULTIMODAL TREATMENT APPROACH  
**AUTHORS (LAST NAME, FIRST NAME):** King, Matthew R.  
**AUTHORS/INSTITUTIONS:** M.R. King, Orthopaedic Manual Physical Therapy Fellowship, Regis University, Denver, Colorado, UNITED STATES;  
**ABSTRACT BODY:**  
**Background & Purpose:** As an individual ages, the prevalence of degeneration of the lumbar spine (LS) and the incidence/prevalence of fecal incontinence increases. LS degeneration can cause a myriad of symptoms, some of which may mimic more severe neurological conditions. The purpose of this case report was to describe a multimodal treatment approach in managing an individual with chronic low back pain (cLBP) and positional neurological symptoms.

**Description:** A 75 y/o male presented to physical therapy with reports of a three to four year history of cLBP with onset of saddle region parasthesias over the last one to two years and reported occasional fecal incontinence. Pain was rated at 10/10 at worst on the Numeric Pain Rating Scale (NPRS), associated with standing and ambulating. The pain was 0/10 at best on the NPRS and was associated with sitting only. The patient reported only being able to ambulate very short distances prior to the onset of symptoms. Oswestry Disability Index (ODI) was recorded at 38%. Trunk range of motion (ROM) was markedly limited in bilateral side bending and extension. Lumbar spinal mobility was hypomobile. Additional neurological screening was unremarkable with good strength throughout. The referring physician was informed of the examination findings and management was commenced. Sessions involved manual techniques consisting of LS neutral gapping mobilizations in side lying, long axis distractions, soft tissue mobilization to LS and hip musculature, directional specific flexion exercises, lower extremity flexibility and cardiovascular training.
Outcomes: The patient was seen for a total of 12 sessions. The ODI improved to 6%, pain improved to 2/10 at worst on the NPRS. Trunk ROM improved to greater than 10° in extension and side bending motions. The patient reported being able to return to his usual exercise routine of ambulating for greater than 20 minutes in his driveway without symptoms. Fecal incontinence and saddle prasthesia, which was positional and intermittent, was abolished within the episode of care. He was instructed if the symptoms returned to seek medical care immediately.

Discussion - Conclusions: This case study demonstrates that there may be individuals whom benefit from physical therapy management presenting with positionally dependent neurological symptoms, which may potentially decrease the utilization of unnecessary imaging and additional medical treatments.


CONTROL ID: 2317222
TITLE: MEASURING KNEE MOTOR CONTROL IN THE CLINICAL SETTING UTILIZING A SMALL PORTABLE LASER: A CASE STUDY
AUTHORS (LAST NAME, FIRST NAME): Dellwo, Timothy D.¹; Osborne, Raine¹; Beneciuk, Jason¹
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ABSTRACT BODY: Background & Purpose: Optimal motor control is an important contributor to knee function. As the menisci are thought to contribute to proprioception, meniscal injuries may result in motor control deficits, potentially decreasing dynamic stability and/or increasing risk of injury or the development of degenerative conditions. Using a laser to assess motor control function and guide intervention has previously been used in other body regions; therefore, a potential for similar utility at the knee exists. Currently, there are no commonly used clinically based standardized objective measures to assess dynamic stability of the knee. The purpose of this case study is to describe a method for assessing knee motor control utilizing a laser placed on the proximal tibia during a single leg squat (SLS) in a clinical setting with a patient status post meniscectomy.
Description: A 43 y/o active female reported an extensive 20 year history of several traumatic knee injuries, including tears of the anterior cruciate ligament (3 times), medial and lateral collateral ligaments, and three medial meniscus tears. The measure of interest was the total amount of error on the knee laser test during a SLS. Error was measured in centimeters (cm) that the laser tracked outside of a 5 cm wide strip (i.e. presumed normal test performance). Sum error, mean error, max range of error and frequency of error on the knee laser test were recorded over a six week period. Initial testing revealed an error sum of 184 cm and maximum error range (MER) of 18 cm.

Outcomes: After six weeks of dynamic stability training, the sum error improved 95 cm (to 89cm), mean error improved from 9.2 cm to 4.5 cm, MER from 28 cm to 18 cm and frequency of error from 20 per trial to 18. The Numeric Pain Rating Scale improved from 4/10 to 2/10. The Lower Extremity Functional Scale improved from 36/80 to 53/80. These exceeded the minimum clinically important difference. She reported an improvement in her functional activities that included walking greater than one mile to/from class and full participation in work duties.

Discussion - Conclusions: Improved laser testing scores may be an indirect reflection of improved motor control and increased knee dynamic stability. However, future research is needed to investigate this association and validate testing methods, as well as to establish a baseline data set of normative values. Increased use of small portable lasers may provide a simple cost effective way to assess knee motor control and dynamic stability in the clinical setting.

KEYWORDS: Knee , Motor control, proprioception.
**Background & Purpose:** Iliotibial Band Syndrome (ITBS) is commonly seen in runners, with an incidence as high as 12%. Running injuries are not limited to any one body region, although a large percentage of injuries occur at the knee. Proximal and distal body regions may contribute to ITBS.

**Description:** A 45 y/o female reported to physical therapy with complaints of right (R) lateral knee pain after four weeks of training for her first marathon. Her "burning" pain, located superior to her lateral joint line, was rated 5/10 on the Numeric Pain Rating Scale (NPRS). Her Lower Extremity Functional Scale (LEFS) score was 74/80; she was only able to run two miles before the onset of pain. Past medical history was insignificant; she denied any prior low back pain. Body Mass Index, gait, and posture were all within normal limits. Shoe wear and foot posture were unremarkable. The patient reported burning in her R lateral knee after performing six 6” step downs in the clinic. Active range of motion (AROM) + overpressure and special testing of the knee were unremarkable. Lumbar AROM revealed limited lumbar extension and R lumbar quadrant testing; both reproduced the R lateral knee pain. Medially-directed unilateral posterior-to-anterior (UPA) passive accessory examination at R L4/5 also reproduced her knee pain. The patient’s right Gluteus Medius strength tested 4/5, while her left tested 5/5. Her sensation was intact to light touch; neural provocation testing was negative. Treatment was initiated with a R medially-directed UPA grade III joint mobilization at L4/5 was performed for three, 5-minute bouts over six sessions. The mobilization forces progressed to grade IV as the patient’s symptoms indicated. She was given repeated lumbar extension in standing as her home exercise program and was issued a return-to-running program.

**Outcomes:** The patient was discharged after six visits with a NPRS score of 0/10, LEFS 80/80, Global Rating of Change (GROC) score of +7. She was able to successfully complete her first marathon without knee pain. The patient’s gluteal muscle strength also returned to 5/5 without performing any targeted strengthening interventions.

**Discussion - Conclusions:** This case highlights the importance of screening regions that may refer to the knee and supports the growing body of evidence of treating the spine for extremity related pain. There may be a subgroup of individuals that respond to lumbopelvic interventions for knee pain. In-depth clinical reasoning is imperative for proper diagnosis and treatment of these patients.

**KEYWORDS:** knee pain, joint mobilization, running.
BACKGROUND & PURPOSE: Cervicogenic headache (HA) refers to a HA of cervical origin. There is a paucity of evidence exists for the addition of dry needling (leaving needles in situ) as an adjunct to manual therapy and exercise in this patient population. The purpose of this case report is to describe the treatment of an adult with cerviogenic HA and neck pain using standard of care (manual therapy and exercise) with the addition of dry needling.

DESCRIPTION: A 45 y/o woman with 5 year history of right-sided HA occurring 4-5 times per week and lasting for 30-60 minutes. Imaging was negative; she had been diagnosed and unsuccessfully treated for migraine HAs. Relevant examination findings included: positive cervical flexion/rotation test [Right (R) greater than Left (L) by at least 20°], limited cervical rotation active range of motion (AROM) L: 74° & R: 62°, reproduction of HA symptoms with unilateral posterior-to-anterior (UPAs to R C1/2, hypomobility to lateral glides C2-C7 (R > L), and weakness in scapular retraction/depression (3+/5) bilaterally (B). Deep neck flexor (DNF) endurance was 17 seconds. Tenderness was noted in the suboccipital group and posterior aspect of sternocleidomastoid (SCM) B. Neck Disability Index (NDI) was 26%. HA Numeric Pain Rating Scale (NPRS) was 3/10 current and 10/10 at worst. Treatment included B C1/C2 rotary cervical manipulation, seated cervicothoracic (CT) junction distraction manipulation, chin tucks, scapular retraction/depression, and DNF retraining. In addition, dry needling for a central pain mediation effect was completed to suboccipitals, spleniuscervicis/capitis, deep cervicothoracic paraspinals C1-T2, and SCM B.

OUTCOMES: After 12 visits over six weeks, her NDI decreased to 0% and HA NPRS improved to 0/10. HA frequency decreased to 0.5 times per week at discharge and 1 time per week at 6 month follow up. Cervical flexion rotation test was negative. Cervical rotation AROM improved to L: 85° & R: 75° immediately after rotary cervical manipulation to the upper cervical spine and seated CT junction manipulation.
**Discussion - Conclusions:** A patient fitting most criteria for cervicogenic HA was treated with manual therapy and exercise, with an adjunct of dry needling. Although immediate effect was demonstrated with manual therapy, it is unclear of the individual contributions of dry needling and postural exercises. Further research into the effectiveness of dry needling (either trigger point dry needling or needles left in situ) in the patient population is needed.

**KEYWORDS:** dry needling, cervical manipulation, cervicogenic headache.

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**CONTROL ID:** 2299994  
**TITLE:** MANUAL THERAPY AND EXERCISE FOR A PATIENT SUSPECTED OF HAVING OSTEOLYSIS OF THE DISTAL CLAVICLE  
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**AUTHORS/INSTITUTIONS:** B.C. Arvizo, Orthopedic Rehabilitation, University of Wisconsin Hospital and Clinics/Meriter, Madison, Wisconsin, UNITED STATES;  
**ABSTRACT BODY:**  
**Background & Purpose:** The most common acromioclavicular (AC) injury is an AC sprain; less common is osteolysis of the distal clavicle (ODC). Although the true etiology of ODC is unknown, it is typically found in weight lifters and manual laborers. Current treatment for ODC includes surgical and nonsurgical approaches. For those patients who undergo surgery, one in three will have poor long-term outcomes. There is a paucity of evidence investigating nonsurgical treatment for ODC. Medication and injections have been shown to only minimally improve patient outcomes. The purpose of this case report is to investigate the effects of manual therapy and exercise on a patient who is suspected of having ODC.

**Description:** The patient presented with a 3 month history of shoulder pain with weight lifting and while working as an automotive technician. Negative special tests included: Neer’s impingement, Hawkins-Kennedy, Speed’s, Yergason’s, bicipital load, Full/Empty can, and Lift-off. Positive tests included Cross-Body adduction, AC resisted extension, AC compression, and O’Brien active compression test, indicating AC joint pathology (positive likelihood ratio of 7.36-8.3). Joint assessment of the AC joint also elicited pain. QuickDASH score was 16%. Therefore, signs and symptoms were
consistent with AC joint irritation most likely due to ODC.

**Outcomes:** Treatment included AC joint mobilizations, therapeutic loading, and scapular exercises. Joint mobilizations included a caudal glide of the distal clavicle. Progression of these joint mobilizations followed an outline by Harris et al. Therapeutic loading to the tissues begin with pain-free modified push-ups and quadruped weight shifts. By the 4th treatment he tested negative for the previous AC joint special tests. Thus he began bench pressing, his most provocative task. Further progression of joint mobilizations and loading were implemented and he was discharged on the 8th visit. He met all goals and was pain free for work and during the bench press. QuickDASH score was 0%.

**Discussion - Conclusions:** This is one of a few case reports that targeted non-surgical intervention for a patient suspected of having ODC. Manual therapy, specifically joint mobilizations, has many theorized mechanisms, including an ability to decrease inflammatory cells and to promote proper healing. The treatment progression outlined joint mobilizations and serial loading to the AC joint. Further research of joint mobilization for patients with confirmed ODC is needed to draw appropriate conclusions.

**KEYWORDS:** Osteolysis of the Distal Clavicle, Manual Therapy, Exercise.
be overlooked. Physical therapists can assist in recovery of function through detailed examination of tissue mobility and function followed by manual therapy techniques to release restrictions.

**Description:** A 45 y/o female presented with headache and neck pain after anterior C4/5 fusion 3 years ago with a complication of a nicked jugular vein. Discussion of singing revealed post-surgical loss of 6 notes at the top of her register (E, F, F#, G, G#, A). This indicated a potential loss at vocal chords (VN innervation), at the tensor veli palentini (TVP) muscle (innervation by the medial pterygoid n. of the mandibular n. branch of the trigeminal V n.) and at the levator veli palentini (pharyngeal plexus innervation, primarily by pharyngeal branch of the VN). Treatment of anterior CS, including mobilization of trachea, esophagus and VN led to improved CS mobility but did not change vocal ability. Further discussion of singing mechanics emphasized the need to elevate and maintain the soft palate shape, thus directing treatment to intraoral structures. Visual assessment during singing revealed loss of height and poor control of right palatine aponeurosis. However, she was able to hold upper register notes without wavering while pressure was sustained in a lateral to medial direction on the hamulus, effectively unloading TVP. Two follow-up sessions focused on hard palate spreading, mobilization of maxillary suture, intraoral and external sphenoid mobilization, soft tissue mobilization to the TVP tendon attachment at the pterygoid hamulus.

**Outcomes:** Immediately after treatment, visual inspection revealed an ability to maintain soft palate shape with and without singing and maintain tone without wavering. The patient reported that the evening following treatment of TVP she was able to reach top of her register, A₅, during choir practice, receiving a standing ovation from the choir.

**Discussion - Conclusions:** This case report describes the effect of manual therapy in the management of vocal range for high-level voice users and supports the need for further research.

**KEYWORDS:** Intraoral, vocal, range.

**CONTROL ID:** 2313410
**TITLE:** MANUAL THERAPY POST FAILED PROGRESSION WITH AN MDT APPROACH IN ACUTE LOW BACK PAIN, UTILIZING A TREATMENT BASED CLASSIFICATION SYSTEM: A CASE REPORT
**AUTHORS (LAST NAME, FIRST NAME):** Keating, Christopher
Background & Purpose: The clinical application of the lumbar treatment based classification (TBC) system attempts to standardize treatment for patients with low back pain (LBP). Up to 50% of patients may have an unclear classification using this TBC system. Therefore, therapists need to utilize clinical reasoning to achieve patient-centered outcomes. The purpose of this case report is to describe the clinical decision making process using the TBC system for a patient with acute LBP.

Description: A 25 y/o patient presented to clinic three weeks after onset of LBP from weight lifting. His chief complaint was left lower lumbar LBP with sitting and bending forward. He presented with a directional preference for lumbar extension combined with a lateral side glide. He was treated with matched direction specific exercise for five visits without change in pain or function. The patient also presented with signs and symptoms predictive of improvement with lumbar manipulation including the presence of lumbar hypomobility, lack of symptoms below the knee, low fear avoidance and hip internal rotation > 35°. Due to the lack of improvement with specific exercise and the presence of signs and symptoms suggesting benefit from manipulation treatment shifted to an orthopaedic manual therapy (OMT) intervention. These techniques included sidelying lumbar manipulation, unilateral lumbar mobilizations, and dry needling to multifidi and paraspinals with electric stimulus. Comparable signs of right side glides and standing extension were improved after manipulation and mobilization to address the lumbar hypomobility. Dry needling was introduced when lumbar motion was restored, but pain remained with exercise. Exercise activities included pelvic tilts, lumbar rotation, core stability training, and general strengthening in order to promote motion and avoid any kinesiophobia.

Outcomes: The patient was seen for five visits without change in pain or function. Once an OMT approach was used beginning at visit 6, a decrease in Numeric Pain Rating Scale from 6/10 to 2/10, an increase in FOTO from 59% to 88%, and return to sport without pain or medication were achieved.

Discussion - Conclusions: The TBC provides a standardized framework of management for patients with low back pain. However clinical reasoning skills are required to determine which treatment will be most effective for individual patients and when changing or combining treatment categories is indicated.

KEYWORDS: Manipulation, Lumbar, McKenzie.
Background & Purpose: Low back pain (LBP) is a common and often self-limiting condition, though a subgroup of these cases develop chronic LBP. Evidence has suggested treating LBP with a patient-centered approach in order to address maladaptive movement patterns could have a protective effect to minimize risk of pain chronicity.

Description: A 42 y/o female part time teacher presented with a chief complaint of acute right sided LBP that began after picking up her son five days prior. Her symptoms were sharp and unrelenting without numbness nor radiating leg pain. She reported 15 year history of episodic LBP, but was pain free prior to this episode. Physical examination revealed limited lumbar flexion to 10° due to pain and fear and full lumbar extension. Repeated motions into extension showed a directional preference for extension. She believed that “her back would snap when bending forward” and “her back was weak.” Although she met criteria for the two-factor lumbar thrust manipulation clinical prediction rule, the initial intervention was non-thrust manual therapy, graded exposure and education to address maladaptive patterns when bending forward. The graded exposure intervention consisted of a progression of activities that were least feared by the patient to the most feared (i.e. lumbar flexion in quadruped progressed to standing lumbar flexion). Primary education included viewing a patient video with a message to convey that the back is strong and resilient.

Outcomes: The patient was seen for three visits, with outcomes assessed at baseline, discharge and nine months follow up. From baseline to discharge: Fear Avoidance Beliefs Questionnaire Physical Activity (FABQ) improved from 23.0 to 3.0, Oswestry Disability Index (ODI) improved from 26% to 2%, Patient Specific Functional Scale (PSFS) score improved from 2.0 to 8.6, and Global Rate of Change (GROC) was +7 at discharge. At nine months her scores were similar: FABQ: 0, ODI: 4% PSFS: 9.6, GROC: +7, with self-management of a flare-up reported.

Discussion - Conclusions: Limitations of this case study include the possibility of spontaneous recovery and the multimodal approach. Nonetheless, this case description demonstrates a patient-centered clinical decision making approach that aimed to decrease maladaptive movement patterns and address patient beliefs through graded exposure and targeted education for a patient with an acute recurrence of chronic episodic non-specific LBP.
Keywords: Manual Therapy, Graded Exposure, Non Specific Chronic Low Back Pain.

Control ID: 2314980
Title: Treatment of Persistent Anterior Shoulder Pain with Cervicothoracic Joint Manipulation and Eccentric Exercise: A Case Report
Authors (last name, first name): Stone, Emily E.
Authors/Institutions: E.E. Stone, Stapleton Rehabilitation, University of Colorado Health, Denver, Colorado, United States;
Abstract Body:
Background & Purpose: Regional-interdependence has been advocated for many musculoskeletal problems. Specifically to the upper quadrant, there is evidence to support orthopedic manual physical therapy to the thoracic spine for management of shoulder pain. Additionally, eccentric exercise has demonstrated good effectiveness in some tendinopathies. The purpose of this case report is to describe the combination of cervicothoracic joint manipulation and eccentric exercise in a patient with persistent anterior shoulder pain.

Description: A 37 y/o recreational boxer reported anterior shoulder symptoms for one year after a pull-up injury. He managed his symptoms independently for one year, including eccentric training, rotator cuff strengthening and upper quadrant stretching. His initial QuickDash was 40.9%, QuickDash sport module was 100% and Patient Specific Functional Scale (PSFS) was 0/10 including activities such as weight lifting, running and boxing. The patient was determined to have biceps tendinopathy with a positive Speed’s test and resisted elbow flexion as well as subacromial impingement with a positive painful arc, Hawkins-Kennedy and Neer test. The patient was treated for four visits over four weeks including cervicothoracic joint manipulation, eccentric exercise for the long head of the biceps, scapulothoracic strengthening and self-mobilization techniques to the thoracic spine.

Outcomes: At the end of the first physical therapy session, the patient had significant changes in Numeric Pain Rating Score (3 points) and pain-free shoulder range of motion. At the end of treatment, the patient had a final QuickDash of 4.54%, QuickDash-sport module of 25%, PSFS of 5.75 and Global Rating of Change was +6.
Discussion - Conclusions: This case report agrees with the existing literature supporting manual therapy of the thoracic spine in the upper quadrant. Additionally this report demonstrates the potential for rapid changes with thrust manipulation in a patient with persistent symptoms.

KEYWORDS: cervicothoracic manipulation, shoulder pain, eccentric exercise.

CONTROL ID: 2317261
TITLE: INFLUENCE OF NORTH AMERICAN INSTITUTE OF MANUAL THERAPY (NAIOMT) CERTIFICATION ON PATIENT CLINICAL OUTCOMES
AUTHORS (LAST NAME, FIRST NAME): Kramer, Dina
AUTHORS/INSTITUTIONS: D. Kramer, Marino Therapy Centers, Knoxville, Tennessee, UNITED STATES;
ABSTRACT BODY:
Background & Purpose: Reimbursement for physical therapy services has declined in the last decade and current treatment models stress volume not value. Pay for performance models are emerging and clinicians often pursue advanced training to improve efficiency of care. A therapist's age or years of experience have not been found to correlate with patient improvement. Emerging evidence suggests that clinical specialization may improve patient outcomes, but very few studies have investigated the type or level of certification required. Big data is changing that and is becoming instrumental in exploring therapist related factors that can influence patient outcomes.

Methods: One year's worth of patient outcomes (April 1, 2014- March 31, 2015) from 15 therapists identified via survey as NAIOMPT certified clinicians were extracted from FOTO's database. The actual outcomes of 1285 patients were compared to Focus On Therapeutic Outcome's (FOTO) risk adjusted predicted outcomes for differences in effectiveness and efficiency. FOTO is a web-based patient assessment system. This database was chosen for this study due to its large number of participating physical therapists (PTs), robust patient data, and risk adjusted predicted scoring. Using historical data, FOTO generates a prediction for a patient's episode of care in terms of effectiveness and efficiency. Effectiveness is defined by functional outcome change score. Efficiency is demonstrated by treatment visits. The FOTO system risk adjusts for ten variables: type of impairments, severity of impairments, intake score, age, onset, gender, payer source, surgery fear avoidance and comorbidities.
Results: The NAIOMT group of PTs achieved greater effectiveness and efficiency when compared to the risk adjusted predicted value. Functional Change Score (FS) was six points greater than FOTO predicted value (p<0.5) and visit number was one less than predicted value (p<0.5). These comparisons were made from a select group of clinician regarding predicted performance, not a control group. Any inference that NIAOMT training caused the significant results is unfounded. However, it does open the door for future research with a control and further exploration into the type and level of certification required to impact patient outcomes.

Discussion - Conclusions: NAIOMT certification may contribute to improved patient outcomes. These findings warrant further research with larger sample sizes as well as exploring other brands of post-graduate education and their impact on patient outcomes.

KEYWORDS: Clinical Outcomes, Manual Certification, NAIOMT.
to the clinic with complaints of bilateral LE pain with activities, including running and participating in sport activities (track & field, swimming). She had undergone multiple diagnostic testing (e.g. ABI, EMG/NC, MRI, bone scan), all of which were negative. Her prior treatment consisted of two failed trials of PT, oral pain medication and psychotherapy. Her physical examination at rest was normal, with no signs of swelling and ischemic changes in bilateral LEs. However, she demonstrated significant allodynia, hyperalgesia and hyperesthesia at the scalp, cervical spine and thoracic spine region. Her PT treatment consisted of a short-term multimodal approach focusing on chronic pain & CECS diagnosis education, RI mobilizations to the cervical, thoracic, and lumbar spine, and progressive neurodynamic mobilization of the spine and LEs. Additionally, treatment also included strengthening and graded exposure of sports activities, which lasted six visits.

**Outcomes:** Outcome measures were measured at 0, 5, and 10 weeks. Changes in outcome measures at 10 weeks were: Numeric Pain Rating Scale improved from 6/10 to 2/10, the Lower Extremity Functional Scale improved from 48/80 to 73/80, and the Tampa Scale of Kinesiophobia improved from 49/50 to 22/68. Her overall Global Rating of Change (GROC) was +6. Her running tolerance improved to 30 minutes without pain.

**Discussion - Conclusions:** This case study supports the RI model for treatment and supports looking beyond the specific pathoanatomic sources. This case report is the first study to report the effectiveness of cervical and thoracic manual therapy in a patient diagnosed with CECS.

**KEYWORDS:** chronic exertional compartment syndrome, cervical spine, mobilization.

**CONTROL ID:** 2315676

**TITLE:** ADJUSTMENT OF TRADITIONAL PHYSICAL THERAPY TREATMENT FOR PATELLOFEMORAL PAIN SYNDROME IN A PATIENT WITH UNDERLYING HYPERMOBILITY SYNDROME

**AUTHORS (LAST NAME, FIRST NAME):** Timmerman, Laura¹; Fleener, Danny²; Pospischil, Kyle P.²; Farrell, Kevin¹

**AUTHORS/INSTITUTIONS:** L. Timmerman, K. Farrell, St. Ambrose University, Davenport, Iowa, UNITED STATES;
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ABSTRACT BODY:

Background & Purpose: Approximately 3% of the population has joint hypermobility syndrome (JHS). In a 2014 survey of United States physical therapists, only a quarter of responding therapists were familiar with the Beighton Hypermobility Scale (BHS) for diagnosing hypermobility. Even fewer were aware of the “extra articular” symptoms (e.g. decreased proprioception, anxiety, fatigue, and sleep disturbance.) In patients with common diagnoses like Patellofemoral Pain Syndrome (PFPS), JHS could be a contributing factor. The purpose of this case report is to describe the differentiation and adjustment of treatment of physical therapy (PT) for a patient with and underlying JHS.

Description: A 34 y/o female was referred to PT with a seven month history of bilateral knee pain which began while training for a half marathon. Initially, the symptoms started after running five miles and progressed to preventing her from running at all. She described her knee pain as a constant ache even at rest. She demonstrated non-specific tenderness, knee range of motion within normal limits bilaterally, and negative knee ligamentous or meniscal special testing. The patient lacked hip extension bilaterally; she performed an extremely quadriceps dominant squat during functional testing. This patient scored a 7/9 on the BHS, but had never been told before that she has hypermobile joints. She also exhibited all the aforementioned “extra-articular” symptoms associated with JHS.

Outcomes: The patient’s comparable signs of poor single leg balance and poor squatting form significantly improved with treatment focused on neuromuscular re-education, core stability and proprioceptive training. Subjective reports of improved sleep and decreased pain at rest and with exercise further demonstrate positive outcomes. She has returned to regular exercise, successfully running for at least one mile without symptoms during or afterwards.

Discussion - Conclusions: This case supports using a thorough subjective and objective exam to determine the underlying cause of PFPS to provide the most appropriate treatment. Most literature on PFPS suggests treatment focused on hip strengthening, patellar mobility, patellar taping and stretching of lateral hip muscles. However, in patients with JHS, patient education, a proximal stabilization and proprioception approach may be more appropriate and beneficial. This case demonstrates how thorough differentiation lead to a treatment approach focused on the underlying cause, resulting in successful patient rehabilitation.

KEYWORDS: Patellofemoral, hypermobility, proprioception.
Background & Purpose: Structural and hormonal changes that occur during pregnancy influence the respiratory system, impacting the function of the diaphragm, intercostals and abdominals. Alterations in mechanics may contribute to compensatory muscle recruitment patterns and rib pain. There is paucity in the literature investigating the relationship between these respiratory changes and associated musculoskeletal pain during pregnancy.

Description: A 38 y/o female with one month history of left (L) constant anterior lower rib pain and intermittent corresponding posterior rib pain was evaluated via direct access. At evaluation, she was 34 weeks gestation with a normally progressing pregnancy. She was a pediatric physical therapist (PT); her goal was to continue working until her delivery date. Her symptoms increased with bending forward and sitting; they decreased with lying supine, abdominal support with a pillow in side lying, extension, swimming and use of maternity brace. Pain intensity on Numeric Pain Rating Scale (NPRS): 0/10 at best, 5/10 at worst. Functional impairments included difficulty working with frequent bending to treat patients and limited sitting tolerance to complete documentation. Examination revealed hyperlordotic standing posture, painfully limited thoracic spine forward bending & L sidebending, hypomobility with forward bending passive intervertebral movement (T10/11), tenderness with palpation of costal insertion of L diaphragm. Impairment-based treatment provided during three visits for 16 days included soft tissue mobilization to the diaphragm, thoracic spine joint mobilizations, therapeutic exercise to promote muscle recruitment and a home exercise program (HEP).

Outcomes: Most outcome measures for pregnant women have been validated for pelvic or low back pain. In addition, use of the Patient Specific Functional Scale has not been validated for use with in patients reporting rib or thoracic spine pain. Therefore, NPRS was the outcome measure utilized in this case. At discharge, the patient was able to successfully manage and reduce her pain with her HEP. NPRS with sitting and bending forward improved to 2/10. Sitting tolerance improved from 15 to 45 minutes for documentation completion with less interruption. She continued working as a pediatric PT with minimal intermittent symptoms until the delivery of her baby, one month after her last treatment.
**Discussion - Conclusions:** This case presents a successful outcome utilizing a multi-modal treatment approach and identifies topics for further research.

**KEYWORDS:** rib pain, pregnancy, manual therapy.

**CONTROL ID:** 2299779

**TITLE:** SHOTGUN HIGH VELOCITY, LOW AMPLITUDE THRUST AND EXERCISE IN THE TREATMENT OF SYMPHYSIS PUBIS DYSFUNCTION: A CASE REPORT

**AUTHORS (LAST NAME, FIRST NAME):** Gieringer, Robert N.¹

**AUTHORS/INSTITUTIONS:** R.N. Gieringer, Physical Therapy, Orthopaedic Manual Therapy Fellowship, Regis University, Denver, Colorado, UNITED STATES;

**ABSTRACT BODY:**

**Background & Purpose:** Symphysis pubis dysfunction (SPD) has been described as a mildly to severely debilitating pain associated with pregnancy, most commonly occurring between the 27th and 32nd week of gestation. Previous studies have reported the effectiveness of exercise in conjunction with pelvic support belts; however, there is minimal research on the direct effects of high velocity, low amplitude thrust (HVLAT) combined with exercise in this patient population. The purpose of this case study is to describe a multimodal approach using orthopedic manual therapy (OMT) consisting of HVLAT to the pubic symphysis and exercise consisting of transversus abdominus and multifidi training for treatment of SPD.

**Description:** A 31 y/o female presented to the clinic with complaints of pubic symphysis pain during the 33rd week of gestation. Signs and symptoms included a positive pain to palpation of the pubic symphysis, difficulty turning over in bed, climbing stairs, a positive Trendelenburg Sign with an associated waddling gait pattern, and a history of bilateral lumbar laminectomies of L3-S1. Oswestry Disability Index (ODI) and Numeric Pain Rating Scale (NPRS) were recorded at initial evaluation and at four week follow-up. Intervention included the shot gun manipulation. Immediately after this, the patient was able to ambulate without Trendelenberg gait pattern. Home exercises included therapeutic exercise targeting the transversus abdominus, multifidus, gluteals and hip abductors.

**Outcomes:** At the four week re-evaluation period, the patients ODI score decreased from 42% to 22%. The NPRS decreased from 6/10 to 2/10. Both scores demonstrated minimal clinically important difference.
**Discussion - Conclusions:** Patients with complaints of pubic symphysis during pregnancy may benefit from HVLAT and exercise to improve patient-perceived disability and pain scores. High quality, randomized control trials on its safety and effectiveness should be further investigated to generalize these results.

**KEYWORDS:** Symphysis Pubis Dysfunction, Shotgun HVLAT.

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**CONTROL ID:** 2313661  
**TITLE:** CLINICAL RATIONALE TO USE DRY NEEDLING FOR RECALCITRANT LUMBAR RADICULOPATHY: A CASE STUDY  
**AUTHORS (LAST NAME, FIRST NAME):** Vraa, Derek L.  
**AUTHORS/INSTITUTIONS:** D.L. Vraa, Department of Physical Therapy, Concordia University St. Paul, St. Paul, Minnesota, UNITED STATES;  
**ABSTRACT BODY:**  
**Background & Purpose:** Lumbar radiculopathy has shown to be effectively treated in physical therapy (PT) with multimodal treatment interventions (traction, direction specific exercise, manipulative therapies and neurodynamic mobilization). Myofascial Trigger Points (MTrP’s) are also potential pain generators causing referred/radicular pain into the leg. Dry needling (DN) for MTrP’s in selected orthopedic conditions has shown promise and a recent systematic review supports DN as an effective adjunct intervention. Currently, there is no literature studying the effects of DN specific to recalcitrant lumbar radiculopathies.

**Description:** A 50 y/o male engineer with a four year history of low back/leg pain was medically diagnosed with a recalcitrant radiculopathy. Past unsuccessful treatment included epidural steroid injection, PT and chiropractic care. Baseline status included: intermittent pain 2-8/10 (Numeric Pain Rating Scale-NPRS), variable radicular symptoms (L4/L5 dermatome) that worsened with walking, sitting and bending. Outcome measures included FOTO© (Focus On Therapeutic Outcomes) intake of 49/100, Fear Avoidance Beliefs Questionnaire physical activity and work subsets (FABQ-PA 22/24, FABQ-W15/42). Patient Specific Functional Scale (PSFS) activities for playing hockey and sitting were both rated at 4/10. Other data included positive slump test, restricted low back/hip mobility, but normal sensation, reflexes, and straight leg raise tests.
Outcomes: After four visits of minimal success, which consisted of manipulation, neurodynamic mobilization and lumbopelvic stabilization, additional assessments for other pain generators were completed. Palpable MTrPs in the ipsilateral gluteal, quadratus lumborum and hamstrings caused referred pain distally into the leg, similar to the L4/L5 dermatome. DN to the targeted muscles was directly integrated into the client's next four treatment sessions. All outcomes improved. NPRS was reduced to 0-1/10, FOTO score improved to 89/100, both PSFS activities improved to 9/10, FABQ-PA improved to 5/24, FABQ-W improved to 10/42. Lumbar motion was restored. His Global Rating of Change was +7.

Discussion - Conclusions: This eight visit case study demonstrates support for DN, as an adjunct treatment for patients with radicular symptoms when other typical treatments for this conditions failed to show improvement. Further research is warranted to identify those individuals with lumbar radiculopathy who would best benefit from DN techniques.

KEYWORDS: Dry Needling, Lumbar Radiculopathy, Soft Tissue.
Description: A 42 y/o woman reported injuring her shoulder while performing water aerobics. A MRI revealed full thickness SLAP and partial thickness RTC tears. Baseline Numerical Pain Rating Scale(NPRS) was 7/10 and DASH (Disabilities of the Arm, Shoulder, and Hand) score was at 88.3% disability. Shoulder active range of motion (AROM) was very limited: flexion (flex): 71°, abduction (abd): 49°, external rotation (ER): 53°, internal rotation (IR): 48°. Shoulder manual muscle testing was impaired: flex: 4-/5, abd: 3+/5, ER: 3+/5 (all painful), and IR: 4-/5. She demonstrated a forward head posture with arthrokinematic impairments noted with upper/middle thoracic extension and with 1st rib caudal glide. For the first month, rigid tape was applied to the shoulder to provide support and promote tissue healing. Thrust and non-thrust OMPT were performed to improve thoracic extension and 1st rib caudal glide. End range joint mobilizations were applied to the posterior and inferior glenohumeral joint. Initially exercise consisted of careful AROM in all planes to improve mobility without overloading her impaired tissues. As patient status improved, skilled exercise progressions were made including scapular stability and neuromuscular control exercises.

Outcomes: The patient was treated for 27 visits over approximately four months with progressive improvement. At discharge, her shoulder AROM and strength were within normal limits, NPRS was 0/10, and DASH score was at 6.7% disability. These improvements were maintained at seven months after her initial visit.

Discussion - Conclusions: Though not able to delineate a causal effect, this case study does suggest that patients with combined shoulder internal and external derangement can benefit from conservative treatment. A regional, multi-modal OMPT approach could be effective in treating patients with concurrent SLAP and RTC tears. Further investigation is warranted.

KEYWORDS: derangement, rotator cuff, SLAP.
ABSTRACT BODY:

Background & Purpose: Over the past several years, there has been a large increase in research regarding the benefits of trigger point dry needling (TPDN) for decreasing both acute and chronic pain caused by myofascial trigger points. The purpose of this case report is to present a case report in which there was successful management of a patient with chronic cervicogenic headaches (HAs) using TPDN.

Description: A 52 y/o female with a history of chronic HAs for the past 20 years denied specific onset of symptoms or mechanism of injury. She reported an increase in intensity of HAs following flu like symptoms six weeks prior, as well as a history of dizziness, nausea, vomiting, chills/sweats, and difficulty swallowing. She described the HAs as “migraines” that occur several times a week, with at least one “bad” HA per week that she rated at 8/10 on the Numeric Pain Rating Scale (NPRS). Examination findings included limited end-range cervical rotation range of motion (ROM) with subcranial sidebend compensation, subcranial restriction and limited mobility of the cervicothoracic junction. Upon soft tissue assessment, soft tissue restriction of bilateral suboccipitals and upper trapezius muscles with active trigger points that referred into the occipital and temporal region on the right were noted. Neck Disability Index (NDI) was 46% on initial assessment, demonstrating moderate disability.

Outcomes: TPDN was initiated as the primary technique. Following treatment of both myofascial restrictions with TPDN, as well as joint restriction with manipulation, she demonstrated overall improved cervical ROM. In addition, she reported decreased intensity and frequency of HAs: only one to two HAs in that month, rated 2/10 at worst on the NPRS. Her final NDI score of 8%, exceeding the minimal clinically important difference. She reported 0/10 pain on the NPRS with occasional discomfort at 2/10 with prolonged sitting and reading at her computer.

Discussion - Conclusions: TPDN is a rapidly growing technique in physical therapy practice. While research for its use in patients with HAs is not strong, TPDN has been shown to be an effective adjunct treatment. The current patient presented with myofascial restriction as a significant impairment creating her HAs and responded well to manual therapy and TPDN. When myofascial restrictions are present TPDN is proving to be a good adjunct technique for successful outcome and warrants further investigation in this population.

KEYWORDS: Trigger point dry needling, Cervicogenic headaches.
TITLE: IMPROVING ANKLE DORSIFLEXION USING A NOVEL DEVICE TO SIMULATE CLOSED CHAIN JOINT MOBILIZATION IN TWO PATIENT CASES

AUTHORS (LAST NAME, FIRST NAME): Jonely, Holly¹; Ryder, Alan²


ABSTRACT BODY:

Background & Purpose: Range of motion can be altered by a variety of etiologies stemming from neurological and orthopedic conditions. Limited ankle dorsiflexion (DF) can negatively impact an individual's ability to perform functional activities safely and efficiently. The current two case studies examined the use of a new ankle DF stretching device, the Dorsiglider™, to improve ankle DF post injury.

Description: Patient A was a 35 y/o male economist status post arthroscopic micro fracture of the right talus. Following eight sessions of physical therapy (interventions included joint mobilization, self-stretch, and four-way ankle strengthening), he changed physical therapists. He complained of anterior impingement with squatting. A closed chain measurement was taken using a trigonometric technique to examine ankle DF: 14.28° left, 5.19° right. His Foot Ankle Mobility Measure Score (FAAM) was 72.61 (ADL Subscale). Patient B was a 25 y/o male graduate student status post distal fibular fracture from a traumatic inversion ankle sprain. After immobilization, he exhibited loss of ankle DF and plantar flexion, as well as stiffness during gait and squatting. A closed chain measurement was taken using a trigonometric technique to examine his ankle DF: 14.28° left, 36.03° right. FAAM was 72.61 (ADL Subscale). Joint accessory motion exhibited decreased posterior talar glide with a firm end feel was noted in both patients. Both patients consented to a trial of self-management using the Dorsiglider™. The protocol included four repetitions of 40 second self-mobilizations (closed chain anterior tibial glide) followed by a mobilization with movement for four repetitions for 40 seconds using the Dorsiglider™. This was completed daily five days per week for four weeks.

Outcomes: Patient A reported the absence of pain with squatting. Both patient A & B exhibited increased functional

**Discussion - Conclusions:** A patient with loss of ankle DF status post immobilization may benefit from use of self-mobilization of the talocrural joint as an adjunct to manual mobilization and to improve range of motion. Future studies should examine the effects of the Dorsiglider™ in a larger patient population before suggesting a global application.

**KEYWORDS:** Dorsiflexion, Closed Chain, Mobilization.

**CONTROL ID:** 2299783
**TITLE:** SCAPULA LIFT-OFF MOBILIZATION IN CONJUNCTION WITH ORTHOPAEDIC MANUAL THERAPY IN THE TREATMENT OF C5 CERVICAL RADICULOPATHY
**AUTHORS (LAST NAME, FIRST NAME):** Gieringer, Robert N.¹
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**ABSTRACT BODY:**

**Background & Purpose:** Cervical radiculopathy is the mechanical or inflammatory compression of the cervical spine root, and can accompany pain moving distally through the midline of the scapula or along its medial border. Previous studies have reported the effectiveness of orthopaedic manual therapy (OMT), strengthening exercises, and traction; however, no study to date has examined the use of a scapula lift-off mobilization as an adjunct to treat C5 radiculopathy. The purpose of this case study is to describe a multimodal approach using OMT strengthening exercises, traction, and scapula lift-off mobilization for treatment of C5 radiculopathy.

**Description:** A 49 y/o male presented to physical therapy with complaints of right sided neck and scapula pain which were affecting his sleep and work. Positive findings included the Wainner et. al (2003) cluster used for identifying patients with cervical radiculopathy and a diminished right C5 muscle stretch reflex. Neck Disability Index (NDI) and Numeric Pain Reporting Scale (NPRS) were recorded at initial evaluation and at the 7th visit discharge. OMPT included a scapular lift-off mobilization. Home exercises included a rotator cuff and scapular stabilization program, as well as,
deep neck flexor and suboccipital strengthening.

**Outcomes:** At the 7th visit, the patient’s NDI score decreased from 38% to 8%. The NPRS score decreased from 5/10 to 1/10. Both scores demonstrated minimal clinical important difference. In addition, the patient noted significant improvements in sleep and work tolerance.

**Discussion - Conclusions:** Patients with complaints of neck and scapula pain due to radiculopathy may benefit from scapula lift-off mobilization as an adjunct to traditional treatment to improve patient-perceived disability and pain scores. High quality, randomized control trials on its effectiveness should be further investigated to generalize these results.

**KEYWORDS:** C5 radiculopathy, scapula, lift-off mobilization.

**CONTROL ID:** 2316257
**TITLE:** USE OF YOGA INSPIRED INTERVENTIONS FOR COORDINATION AND ENDURANCE TRAINING IN A PROFESSIONAL PERFORMING ARTIST: A CASE REPORT
**AUTHORS (LAST NAME, FIRST NAME):** Clark, Lauren M.; Osborne, Raine; Beneciuk, Jason
**AUTHORS/INSTITUTIONS:** L.M. Clark, R. Osborne, J. Beneciuk, Brooks Rehabilitation, Orlando, Florida, UNITED STATES;
**ABSTRACT BODY:**
**Background & Purpose:** Professional performing artists place great physical demand on their bodies daily and must maintain the endurance and coordination to continue at this level without injury. Performing artists require large ranges of movement in conjunction with postural control, which leads to a unique demand for rehabilitation. Yoga is a technique that is practiced to promote control and posture; therefore, it may be beneficial to inspire and integrate into patient centered interventions for the performing artist to prepare for return to the stage. The purpose of this case report is to describe the use of yoga inspired interventions for coordination and endurance training in a professional performing artist.

**Description:** A 29 y/o female presented to physical therapy with a two year history of cervical and thoracic pain. The patient reported difficulty with maintaining posture without an increased amounts of pain while performing as a singer
and dancer six times per day. Key exam findings included decreased spinal postural muscular endurance and coordination and reduced cervical and thoracic active range of motion. The primary goal was to make treatment as patient specific as possible for maximum functional application and patient participation. Therefore, interventional focus included movement patterns required for performance and yoga inspired interventions modified for goals of muscular endurance and coordination combined with manual therapy for the cervical and thoracic spine.

**Outcomes:** Following six weeks of physical therapy with a focus on yoga inspired endurance and coordination activities utilizing endurance dosing principles and manual therapy, the patient demonstrated improved performance time without symptoms. The patient also demonstrated improvements in self reported outcome measures, the Neck Disability Index, Numeric Pain Rating Scale, and Patient Specific Functional Scale, which met available minimally clinically important difference and minimal detectable change thresholds.

**Discussion - Conclusions:** Treatment that is specific to the needs and interests of the performing artist may improve the patient’s ability to perform and improve objective outcomes. Exercise dosing should match the specific demands of the patient’s activity for maximum functional application, such as the endurance dosing used in this case. Clinicians may consider utilizing a patient centered care model with application of performing arts specific techniques to improve physical therapy outcomes in the performing artist.

**KEYWORDS:** Performing Arts, Thoracic Spine, Patient Centered Care.
physical therapists, and treatment is usually based on clinician subjectivity and patient tolerance. This case report demonstrates the successful rehabilitation for a patient with AC who made a full recovery without functional limitations.

**Description:** A 44 y/o stay at home mother presented with a five month history of idiopathic shoulder AC. Examination revealed a capsular pattern, moderate pain (7/10) on the Numeric Pain Rating Scale (NPRS), and limitations in activities of daily living (ADLs) and child-rearing. She rated her initial Disabilities of the Arm, Shoulder, Hand (DASH) at 45% and reported a 2 on the Patient Specific Functional Scale (PSFS). Magnetic resonance imaging confirmed the clinical diagnosis of AC. After lack of progress during a course of conservative management, the patient underwent a translational manipulation under anesthesia (MUA) five months after her diagnosis and during the freezing stage. The patient began physical therapy the same day of her MUA and completed a non-aggressive impairment based treatment regime of manual therapy and exercise. Her initial physical examination revealed passive range of motion (PROM) for flexion 80°, abduction 85°, external rotation 25°, and internal rotation 60°. Due to her high irritability and low tolerance to pain, she was treated with non-aggressive high repetition mobilizations and prolonged stretching to tolerance with high repetition, low resistance endurance strengthening into her newly gained range.

**Outcomes:** Statistically significant outcomes (monitored from baseline to discharge at 18 weeks) revealed DASH improvement to 4%, NPRS decreased to 1/10, and PSFS increased to 9. At discharge the patient’s PROM for flexion was 180°, abduction to 160°, external rotation 80° and internal rotation of 65°. The patient demonstrated significant improvement in her functional return to her ADL’s, self-care and active lifestyle.

**Discussion - Conclusions:** Significant improvement was made throughout the patient’s rehabilitative process using a non-aggressive impairment based treatment model that was geared to patient tolerance. This case demonstrates a successful outcome following a MUA where the patient returned to unrestricted activity and her role as a caretaker using a patient-centered approach over a long period of time.

**KEYWORDS:** Adhesive Capsulitis, Manipulation Under Anesthesia, Manual Therapy.
Background & Purpose: In a clinical setting, the most challenging patients can be those with chronic pain. Chronic pain is associated with disruptions in the somatosensory and motor cortices and is difficult to treat with typical therapeutic interventions. Graded Motor Imagery (GMI) is a series of interventions aimed at reorganization of these areas and has been used to successfully treat chronic pain conditions such as chronic regional pain syndrome and phantom limb pain. Less is known about GMI in chronic upper extremity (UE) and headache (HA) pain.

Description: A 46 y/o female with history of multiple thoracic outlet surgeries had been receiving physical therapy for 13 months following her most recent surgery in order to restore function, address residual chronic pain in the right UE and chronic HAs. Previous interventions included desensitization techniques, manual therapy, shoulder strengthening and stretching, aquatic therapy and fine motor tasks with limited success. Upon reassessment, neurological examination was limited due to the patient's intolerance to light touch testing: she demonstrated decrease in hot/cold sensitivity. At this time, GMI was integrated into her plan of care. Grade III posterior-to-anterior mobilization at the right atlanto-occipital joint were integrated to manage HAs. Grade III thoracic mobilizations were administered to hypomobile segments to facilitate shoulder mobility. After the introduction to GMI, treatment was split into “hard days” consisting of therapeutic exercises (to increase exercise tolerance) and “light days” consisting solely of manual therapy directed at specific sites based on symptoms (to mitigate symptom exacerbation).

Outcomes: Symptoms were assessed at each treatment and were quantified with the Numeric Pain Rating Scale (NPRS). Manual Muscle Testing, Range of Motion (ROM) and grip strength were evaluated at initial evaluation and Weeks 1 and 9 of the GMI interventions. The patient verbally reported the nature and duration of symptoms throughout intervention. HAs decreased in duration, intensity and frequency. Her typical shoulder pain decreased from 5-7/10 to 2-3/10 on the NPRS; however, elbow hyperalgesia, 4th and 5th digit fingertip numbness and pain persisted, and she had a decrease in UE ROM.
Discussion - Conclusions: These outcomes suggest that GMI may be successful with chronic pain management after surgery; however, more research is needed on the most effective way to incorporate GMI in a clinical setting.

KEYWORDS: Graded motor imagery, chronic pain.

CONTROL ID: 2319130
TITLE: POSITIVE EFFECTS FROM A BRIEF SESSION OF ORTHOPEDIC MANUAL PHYSICAL THERAPY ON PAIN AND FUNCTION FOR A HIGH SCHOOL ATHLETE WITH CHRONIC ANTERIOR KNEE PAIN
AUTHORS (LAST NAME, FIRST NAME): Young, Thomas W.¹
AUTHORS/INSTITUTIONS: T.W. Young, Regis University Manual Therapy Fellowship, Overland Park, Kansas, UNITED STATES;
ABSTRACT BODY:
Background & Purpose: Anterior knee pain is a common complaint in young athletes and can present with a variety of causes. Screening for prior injury/impairments is needed to ensure sufficient mobility throughout the lower quarter exists for optimal knee function. Talocrural, tibiofibular, and tibiofemoral deficits are common examination findings that cause increased stress at the knee. There is evidence that orthopedic manual physical therapy (OMPT) is an effective treatment strategy to improve function in patients with anterior knee pain. The purpose of this case is to describe an impairment based OMPT management approach for a high school athlete with chronic left (L) knee pain whose immediate improvement in pain and function was maintained at 16 week follow up.

Description: An 18 y/o basketball player presented to physical therapy with a three month history of L anterior knee pain. The symptoms included: gradual onset of 5/10 pain on the Numeric Pain Rating Scale (NPRS), increased pain with squatting, stair navigation and running; Lower Extremity Functional Scale (LEFS) score of 55/80; decreased ankle dorsiflexion (DF) via the kneeling test and arthrokinematic impairments (talocrural joint, proximal tibiofibular anterior glide and lateral glide of the proximal tibia moving on the femur). Knee range of motion, strength, ligamentous and meniscal testing of the L knee were non-provocative and symmetrical. His past medical history was positive for ipsilateral Achilles tendinoapthy that resolved prior to the basketball season. Mobilization with movement (MWM) for proximal lateral tibial glide during single leg squats eliminated pain after three bouts of 10 repetitions. Single repetition of thrust manipulation to the talocrural and proximal tibiofibular joints resolved remaining symptomatic impairments and
restored symmetrical ankle DF. The patient was instructed on self tibiofemoral MWM and ankle DF stretching; closed chain strengthening and plyometric training were then incorporated to promote a safe return to sport.

**Outcomes:** The patient was managed for two sessions (evaluation and 2 week follow up) along with follow up via email (8 and 16 weeks). Across all follow up session: NPRS remained at 0/10 with all activities, LEFS was 80/80, ankle DF was symmetrical, and he was able to return to sports without limitations.

**Discussion - Conclusions:** A brief session of impairment-specific OMPT techniques applied throughout the lower extremity eliminated pain and restore function in a young athlete with chronic anterior knee pain.

**KEYWORDS:** knee pain.

**CONTROL ID:** 2319329
**TITLE:** TREATMENT OF A PATIENT WITH LUMBAR INSTABILITY AND CENTRAL SENSITIZATION WITH THE ADDITION OF TRANSCUTANEOUS ELECTRICAL MUSCLE STIMULATION AS A PAIN SENSITIVITY MEASURE AND TREATMENT APPROACH
**AUTHORS (LAST NAME, FIRST NAME):** Fitzgerald, Laura¹; Beneciuk, Jason¹
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**ABSTRACT BODY:**
**Background & Purpose:** Central sensitization, observed clinically as allodynia and exaggerated sympathetic nervous system response, is thought to be a result of an amplification of neural signaling within the central nervous system. This includes lower activation thresholds of the nociceptors, altered cortical processing and disruption of descending pain inhibition pathways. Transcutaneous electrical muscle stimulation (TENS) has traditionally been utilized for pain relief as a desensitization mechanism via variable exposure to mechanical stimuli. Therefore the purpose of this case report was to describe use of TENS as a pain sensitivity measure and desensitization method in combination with manual therapy and exercise for a patient with chronic low back pain.

**Description:** A 45 y/o mother of seven presented with left sided low back pain and right posterior hip pain ongoing over
the past 15 years. Key physical examination findings consisted of limited spinal active range of motion, muscle guarding, joint hypermobility, adverse autonomic response to movement, and allodynia. Treatment consisted of combination of manual therapy including high velocity low amplitude manipulation, oscillations and soft tissue techniques, exercise, and TENS applied to the lumbar spine at a strong but tolerable level during therapeutic exercise in attempt to promote adaptation and normalize nervous system sensitivity. TENS was utilized on sessions 6-11 using strong but tolerable level applied for 8-15 minutes during therapeutic exercise with increasing intensity tolerated over subsequent sessions (6mV, 12 mV, 23 mV, 19 mV, 25 mV). At visit 12, she demonstrated improved tolerance to exercise without an increase in pain, thus TENS was discontinued.

**Outcomes:** Following 20 physical therapy sessions, the average pain intensity ratings using on the Numerical Pain Rating Scale over past seven days improved (7/10 to 1/10). Oswestry Disability Index (44% to 18%) and Patient Specific Functional Scale scores also improved (1.75 to 7.25). At discharge patient had returned to activities of daily living, recreational sporting activities and independent resistance training program.

**Discussion - Conclusions:** This case report describes the use of TENS in conjunction with manual therapy and exercise in the treatment of a patient with chronic lumbar instability with signs of central sensitization using TENS as a pain sensitivity marker. Further research is needed to determine the validity and reliability of using these treatment methods in clinical settings.

**KEYWORDS:** Lumbar instability, central sensitization, Transcutaneous Electrical Muscle Stimulation.
**Background & Purpose:** Patellofemoral pain syndrome (PFPS) is a common knee disorder seen by physical therapists. There is a lack of understanding as to how lumbopelvic manipulation improves patellofemoral pain. However, certain patients with PFPS may respond favorably to lumbopelvic manipulation. The purpose of this case study is to describe the use of lumbopelvic manipulation in the treatment of thigh paresthesia and PFPS.

**Description:** A 19 y/o female was referred to physical therapy with a diagnosis of PFPS. She reported a two year history of intermittent lateral thigh paresthesia and a three month history of knee pain, which limited squatting, sitting and exercise activities. The lumbopelvic screen was negative for dermatomal or myotomal deficits. Decreased lumbar segmental motion was observed and left lumbar hypomobility with mobility testing was identified. Left knee motion was normal, but painful at end range of knee flexion. There was decreased flexibility of the left iliotibial band, which was asymptomatic at the knee. Her primary complaint of pain was squatting was 6/10 on the Numeric Pain Rating Scale (NPRS). Sitting in class for 45 minutes was also 6/10. Lower Extremity Functional Scale (LEFS) at the initial evaluation was 60/80.

The patient was seen for seven visits over seven weeks. A home exercise program was given for iliotibial band flexibility and hip strengthening at evaluation. During the 2nd visit, thrust manipulation to the lumbopelvic region was utilized due to the continued restrictions of the lumbar spine. Immediate improvements in squatting ability and decreased knee pain were noted. Closed-chain strengthening, core strength and balance activities were utilized to improve lower chain movement patterns and control.

**Outcomes:** Squatting activity and knee pain were markedly improved after the 2nd visit. At discharge, NPRS was 01/0 for squatting; LEFS was 80/80 and thigh paresthesia had ceased.

**Discussion - Conclusions:** Lumbopelvic manipulation in this patient with PFPS may have been beneficial to decrease thigh paresthesia, decrease knee pain and improve function.

**KEYWORDS:** Lumbopelvic Manipulation, Patellofemoral Pain Syndrome , Regional Interdependence.
**Background & Purpose:** Validation studies of treatment based classifications (TBC) for back pain have found barriers to their utility in clinical practice, including subgroup overlap and disparity of treatment outcome across classifications. Based on critical appraisal, TBC have the potential to meet patient expectations while posing low risk of adverse effects from the treatments. The purpose of this case study was to examine the management of low back pain using TBC combined with impairment based manual therapy.

**Description:** A 43 y/o male reported intermittent low back pain over the past year, which he was managing on his own with weight loss and exercise. For the month prior to initial examination, he was experiencing burning pain that spread from his “hips to his knees,” especially upon standing after sitting. Baseline Numerical Pain Rating Scale (NPRS) was 8/10 and Oswestry Disability Index (ODI) was 48%. Aberrant lumbopelvic rhythm during forward bending, pain and instability during prone instability test, a bilateral Clarke's sign and gross impairments of hip range of motion and lower quarter muscle performance were significant findings. Initial management strategies included motor control exercise as indicated by the stabilization TBC. As pain and motor control improved, manual therapy and exercise to address impairments of lower quarter mobility and muscle performance was introduced.

**Outcomes:** The patient was seen for a total of nine visits over six weeks. On the last day of therapy, the NPRS was 0/10 and the ODI 0%. The patient demonstrated improved motor control and reduced lower quarter impairments.

**Discussion - Conclusions:** Using the TBC approach, the presence of symptoms in the legs would place this patient into either the traction or specific exercise subgroups. Therapist reflection on the presence of recurrent episodes of back pain, patient preference for active management strategies, and the presence of stabilization predictor variables led to the selection of the stabilization subgroup. As pain improved, the patient was able to tolerate impairment based manual therapy and exercise which led to an optimal functional outcome.
**KEYWORDS:** Chronic Back Pain, Manual Therapy, Treatment Based Classification.

**CONTROL ID:** 2316119

**TITLE:** ONE FUNCTIONAL TOOL DOES NOT FIT ALL ATHLETES

**AUTHORS (LAST NAME, FIRST NAME):** Gillund, Jordan¹; Pospischil, Emily²; Kersten, Todd²; Farrell, Kevin¹

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**ABSTRACT BODY:**

**Purpose:** Measuring and tracking outcomes has become a core component of physical therapy practice. There has been an interest in using web-based all encompassing functional tools that offer various outcome measures which can be tracked over time and compared to national databases. These have been designed to be inclusive across all diagnoses and patient demographics, but still purported to be specific to the region or impairment. One common web-based functional outcome tool is Care Connections (CC). These types of systems are convenient, as they have eliminated the need to select an appropriate functional tool on an individual basis. However, they may not be sensitive to the patient’s true functional status or change in function. In these instances, other outcomes such as the Patient Specific Functional Scale (PSFS) may be more appropriate. The purpose of this special interest report is to present three case examples of where the PSFS was a more appropriate functional tool.

**Description:** The first patient is an 18 y/o female with complaints of low back pain with horseback riding longer than 30 minutes. She showed horses competitively and needed to ride for over an hour. At intake her CC Lumbar outcome survey score was 86% function. Her PSFS was 0/10 and reported she was ‘completely unable’ to compete in horseback riding, crossfit workouts, and bicycling. The second patient was a 16 y/o male with shoulder pain. His CC Upper Extremity score was 92% functional, yet he reported he was ‘completely unable’ to pitch and his PSFS was 0/10. He reported moderate disability with weight lifting (3/10) and golf (5/10). The third patient was a 15 y/o female with knee pain during volleyball. Her intake CC score was 94% functional yet she reported she was ‘unable to participate’ in sport and her PSFS score was 2/10.

**Summary of Use:** The three patient cases above are examples of instances where one generic functional outcome tool was not representative of the patients' functional limitations. Selecting the most appropriate outcome tool for each patient
will have increased reimbursement ramifications in the pay-for-performance model of the future. The clinician must recognize when an individually selected functional outcome tool is the most appropriate tool.

**KEYWORDS:** outcome, tool, functional.

**CONTROL ID:** 2312037  
**TITLE:** RESOLUTION OF RECURRENT BILATERAL HEEL PAIN WITH THE ADDITION OF ASTYM TREATMENT TO EVIDENCE-BASED PHYSICAL THERAPY CARE: A CASE REPORT  
**AUTHORS (LAST NAME, FIRST NAME):** Candy, David  
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**ABSTRACT BODY:**  
**Background & Purpose:** Plantar heel pain and insertional Achilles tendinopathy (AT) are common forms of heel pain, with central and peripheral sensitization possibly contributing. Regional manual therapy (MT) and exercise (Ex), particularly eccentrics (Ecc), are known effective treatments. Astym, while described in the treatment of several soft tissue disorders, is unstudied for heel pain. The purpose of this report is to describe the effect of adding Astym to standard treatment for a patient with recurrent bilateral heel pain.

**Description:** A 66 y/o female presented to physical therapy with a two month history of right (R) plantar heel pain and prior left (L) heel pain which resolved nine months prior with steroid injection. Initially her pain lasted all day, but oral steroids limited her pain to the first steps in the morning. This eased after 10 minutes, but she found this intolerable and feared her pain would "become acute" again. R tibial (1st branch of lateral plantar) and L sural neurodynamic tests, palpation of the same, and single-leg heel raise were the only exam findings that produced her pain. Excessive R and insufficient L foot pronation during gait, bilaterally limited ankle dorsiflexion range of motion (ROM) and hip strength, and lower quarter joint dysfunctions were also noted. Initial treatment consisted of MT, Ex, and neuromobilization (NM). Her R foot was pain-free at her fourth visit, but then her L heel pain consistent with AT recurred. This improved, but not completely, after two treatments of MT, Ecc, and NM. After adding Astym on her L for two visits, her pain resolved, but her R foot pain returned. Astym was performed bilaterally for two additional visits with full symptom resolution.
Outcomes: The patient’s first-step pain improved from 10/10 to 0/10 at discharge. Lower Extremity Functional Scale (LEFS) score improved from 63/80 to 75/80. 6 months later. She remained pain-free with a LEFS of 70/80.

Discussion - Conclusions: This patient improved with MT, Ex, Ecc, and NM, but the addition of Astym gave her lasting relief. Given her bilateral recurrent heel pain and positive neurodynamic tests, central and/or peripheral sensitization likely contributed to her pain. Joint and exercise-based treatments may not fully address the peripheral pain drivers of these mechanisms. Addressing soft tissue with Astym may provide pain inhibition through spinal or supraspinal mechanisms in addition to the local tissue response. Further research is needed to evaluate the effectiveness and mechanism of action of Astym.

KEYWORDS: heel pain, regional interdependence, Astym.

CONTROL ID: 2316692
TITLE: INTEGRATING MANUAL THERAPY AND MOVEMENT SYSTEM IMPAIRMENTS FOR A PATIENT WITH PROXIMAL TIBIOFIBULAR DYSFUNCTION AND PERONEAL NERVE IRRITATION SECONDARY TO TIBIOFEMORAL ROTATION SYNDROME
AUTHORS (LAST NAME, FIRST NAME): Melroy, Brent C.¹
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ABSTRACT BODY:
Background & Purpose: Movement System Impairments (MSI) and manual therapy can be used together in treatment. However, there is little evidence examining the combination of these interventions.

Description: The patient's pain began insidiously two years prior; he started running approximately two years ago. His pain progressively worsened, starting initially with walking and jogging activities and spiraling until he reported constant pain. He was diagnosed with runner’s knee and was unsuccessfully treated by physical therapy with iliotibial band (ITB) stretching, fibular manipulations, and hip strengthening. Imaging subsequently revealed a lateral meniscus tear and he underwent a menisectomy procedure. He presented with a posterior fibular dysfunction, a positive straight leg raise (SLR) with common peroneal nerve irritation, positive Thomas test (implicating tensor fascia lata (TFL) and ITB). MSI
indicated tibiofemoral rotation syndrome with (single leg squat, standing hip flexion, standing knee flexion), excessive lateral tibial rotation during gait, 2+/5 medial hamstring, and hip external rotation. During subsequent visits the focus moved away from post-op treatments and focused on the lateral knee / leg irritation. Manual interventions included side-lying fibular manipulation, tibiofemoral medial rotation mobilization with flexion. MSI treatments included retraining movement patterns during squats and open kinetic knee chain knee flexion to decrease the tibiofemoral rotation syndrome and overcoming relative flexibility issues between his TFL/ITB and tibiofemoral medial rotators. Pre/post videos were used with Ubersense.

**Outcomes:** After six visits, he had had full knee motion, normal gait pattern, 0/10 pain on the Numeric Pain Rating Scale, and no sleep disturbance. He demonstrated normal tibiofemoral rotation during knee flexion, proper mechanics during closed chain activities, negative SLR findings, normal proximal tibiofibular mobility and positioning. He was able to return to light jogging activities without any irritation.

**Discussion - Conclusions:** This case study demonstrates the importance of correcting MSI in conjunction with correcting the joint dysfunction. It is the position of the author that the use of both joint dysfunction treatments and MSI dysfunctions are imperative for successful outcomes in the most efficient course of action. More studies would be beneficial to understand the movement/biomechanical relationship with specific joint dysfunctions in non-traumatic conditions.

**KEYWORDS:** Movement System Impairments, Peroneal Nerve, Proximal fibula dysfunction.
management strategies for this patient population have not been described in the literature. The purpose of this case study is to examine the effects of a multimodal OMPT intervention in a patient with MS.

**Description:** A 42 y/o female, diagnosed with MS in 2008 demonstrated progressive weakness in left hip and leg. Her physician referred to physical therapy in 2014 secondary to a relapse. Her initial evaluation required two sessions. She presented with decreased motor control of bilateral lower extremities, decreased balance, and numbness in the left (L) leg and occasionally in the right foot. Her activity limitations included difficulty sitting, standing, and walking. Though ambulating without an assistive device, she demonstrated decreased clearance and stance phase of the L foot. Further screening of the lower quarter revealed moderately limited lumbar range of motion, decreased flexibility in the L piriformis, and a painful L straight leg raise (SLR) rated at 5/10 on the Numeric Pain Rating Scale (NPRS). Initial treatment consisted of lumbar manipulation, nerve glides, and hamstrings and piriformis stretching. This resulted in a decrease in pain with her SLR, an increase in lower extremity strength and improvement of her gait pattern. The patient was then progressed to balance (from static to dynamic) and functional activities (lifting, carrying and squatting).

**Outcomes:** The patient was seen for 12 sessions over approximately one month. All outcomes improved. The Patient Specific Functional Scale improved from 3.67 to 8 (walking, standing & cooking, carrying laundry). The Time Up and Go has a fall risk cut-point of 14 seconds. She improved from 16 to 12 seconds. Five Times Sit-to-Stand improved from 23 to 13 seconds. The 2 minute walk test distance increased from 360 to 600 feet. She improved moderate improvement in gait and resumed most daily activities by discharge.

**Discussion - Conclusions:** This case study illustrates that orthopedic impairments may lead to an apparent worsening of symptoms related to MS. Patients with MS may benefit from a multimodal physical therapy treatment including OMPT interventions.

**KEYWORDS:** Manual skills, neurological problems, combination.

**CONTROL ID:** 2316141
**TITLE:** THE UTILIZATION OF A MULLIGAN MOBILIZATION WITH MOVEMENT TECHNIQUE IN A PATIENT WITH LATERAL EPICONDYLAGIA
BACKGROUND & PURPOSE: Lateral epicondylalgia is characterized by pain and tenderness located over the wrist extensors insertion at the lateral epicondyle of the humerus. Eccentric training has been shown to be a conservative and effective treatment. Unfortunately, each patient does not always respond as expected with eccentric exercise; therefore, modifications must be made. The purpose of this case report is to support the use of a Mulligan mobilization with movement (MWM) technique for a patient suffering from lateral epicondylalgia.

DESCRIPTION: A 39 y/o female was referred to physical therapy (PT) with left lateral epicondylalgia. Symptoms were aggravated with activities involving gripping, pinching, active and passive movement of the wrist or elbow, and palpation over the area. The cervical spine and other proximal components were ruled out. The patient’s comparable signs included repeated wrist extension active range of motion (AROM) and pain ratings with the use of the 10-cm visual analog scale (VAS). The patient received three treatments of PT focusing on AROM and eccentric training; however, she could only perform the exercises with assistance from the right hand due to pain. At each session, no carry over was noted in the amount of repetitions that the patient could actively perform or in VAS scores. On the 4th visit, the Mulligan MWM technique, a lateral glide of the forearm in regards to the humerus, was implemented while the patient performed her eccentric exercise routine. This was continued for six sessions.

OUTCOMES: The patient’s wrist extension AROM improved from "unable to perform" due to pain to completion of 20 eccentric repetitions. She completed wrist flexion, radial deviation, and gripping activities independently with much less pain and for greater repetitions. The patient was able to perform more activities involving the affected arm with less pain and assistance needed. VAS scores improved from 8.1 to 5.2 cm (minimal clinically important difference: 3.0 cm). The self reported Upper Extremity Care Connections survey was completed. At initial exam, the patient reported a 44% function; at discharge she reported a 36% function.

DISCUSSION - CONCLUSIONS: This case supports the use of the Mulligan MWM technique for treatment in lateral epicondylalgia. The patient was able to progress her active and eccentric training exercises. Without the use of this glide, treatment may have continued to be non beneficial and the patient’s recovery slowed.
KEYWORDS: Lateral Epicondylitis, Mulligan Mobilization with Movement, elbow.

CONTROL ID: 2317473
TITLE: DRY NEEDLING IN THE MANAGEMENT OF KNEE PAIN IN A 72 YEAR OLD RECREATIONAL RUNNER
AUTHORS (LAST NAME, FIRST NAME): Sabadis, Sebastian; Gattie, Eric R.
AUTHORS/INSTITUTIONS: S. Sabadis, E.R. Gattie, Rehab, Concord Hospital, Concord, New Hampshire, UNITED STATES; 
ABSTRACT BODY: 
Background & Purpose: Dry needling is a skilled intervention that uses thin needles to penetrate the skin and stimulate myofascial trigger points, muscular and connective tissues for management of pain and movement impairments. The purpose of this case study was to describe a physical therapy (PT) treatment approach including dry needling, soft tissue techniques, patella mobilizations, and an exercise program in a patient with knee pain.

Description: A 72 y/o female presented to PT with complaints of left anterior knee pain. The sudden onset while running occurred approximately four months prior to her PT evaluation. She reported difficulty climbing stairs, walking greater than ten minutes, and with her fitness routine. Previous medical interventions included four cortisone injections, which did not improve the symptoms. Her goal for PT was to return to her active lifestyle, including running. Examination revealed decreased strength in right hip abduction manual muscle test (MMT) 3+/5, and knee extension MMT 4/5, and limited quad flexibility. Multiple trigger points were found in the right quadriceps.
Initially, treatment included manual therapy interventions (manual trigger point release of the quadriceps and patella mobilizations), as well as exercises (stretching, strengthening and proprioceptive training). Starting on the fifth visit, dry needling was added, in conjunction with progression of her strength exercises.

Outcomes: Patient was seen for a total of 12 visits. On her discharge visit, she reported a decrease in pain on the Numeric Pain Rating Scale from 6/10 to 0/10. Her Lower Extremity Functional Scale score improved from 62/80 to 80/80. She regained full quadriceps flexibility and strength. She was able to resume her activities, including 30 minutes of running every other day.
Discussion - Conclusions: In this case, dry needling was effective for addressing the trigger points in the quadriceps and accelerating the patient’s recovery. She noticed improved symptoms and function after the first needling session. After a total of five needling sessions, the patient returned to the previous level of function. Patients with knee pain presenting with palpable trigger points in the quadriceps associated with limited strength, and decreased flexibility of the quadriceps may benefit from dry needling.

KEYWORDS: Dry Needling, anterior knee pain, Trigger Point.

CONTROL ID: 2313348
TITLE: DIAGNOSIS OF NON-SMALL CELL CARCINOMA IN A PATIENT WITH UPPER QUARTER PAIN.
AUTHORS (LAST NAME, FIRST NAME): Hensley, Craig P.¹; Emerson-Kavchak, Alicia²
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ABSTRACT BODY:
Background & Purpose: While emphasis has been placed on screening for serious medical pathology during the initial evaluation, it is also important for physical therapists (PT)s to screen for “red flags” throughout the episode of care. Though sinister pathology can be referred from multiple areas, research on screening by PTs has primarily focused on the lumbar spine. Further, patients with a presentation complicated by multiple complaints, including central sensitization and/or biopsychosocial influences, can challenge the clinician’s screening accuracy. The purpose of this case report was to describe the clinical reasoning and differential diagnosis process of a patient with upper quarter pain.

Description: A 59 y/o female with a five month history of left thorax, cervical, and shoulder pain was referred to physical therapy. She had received multiple interventions, including chest wall injections and anti-inflammatory medications, which did not completely resolve her pain. Chest, cervical spine, and shoulder x-rays were negative. The patient reported multiple recent stressful incidents and answered positively on the Whooley questions. She reported an increase in shortness of breath and sweating in the recent past, but stated both were improving. She endorsed smoking for 20 years, but quit 12 years prior. She denied any other red flags. Multiple activities were reportedly aggravating.
Shoulder, cervical and thoracic active/passive range of motion (ROM) and joint mobility examination increased her pain. Allodynia was present throughout the left upper quarter. She tolerated the bike for 20 minutes with no increase in symptoms and reported decreased pain. Thus, manual therapy, therapeutic exercise, and stress management and pain education were initiated.

**Outcomes:** The patient was seen for five visits over 35 days. Her shoulder flexion active ROM improved (85-140°), pain improved (9-6 on Numeric Pain Rating Scale) and QuickDASH score decreased (43-34%). However, on her fifth visit, she reported an increase in pain, fatigue, hyperhidrosis, dyspnea, and loss of appetite over the past week. The patient was sweating on her face. The primary care physician was notified; a CT scan of the chest was obtained. The patient was diagnosed with non-small cell lung carcinoma.

**Discussion - Conclusions:** This case report highlights the importance of PTs evaluating for red flags throughout the course of care as pathological conditions can be masked in a presentation complicated by central sensitization and/or biopsychosocial stressors.

**KEYWORDS:** lung cancer, upper quarter pain, screening.

**CONTROL ID:** 2304934
**TITLE:** THERAPEUTIC NEUROSCIENCE EDUCATION WITHIN A MULTIMODAL INTERVENTION FOR CHRONIC LOW BACK PAIN: A CASE REPORT
**AUTHORS (LAST NAME, FIRST NAME):** Edmundson, Christopher
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**ABSTRACT BODY:**
**Background & Purpose:** Altered beliefs about pain and psychosocial influences have been shown to contribute to chronic low back pain (CLBP) and disability. Therapeutic neuroscience education (TNE) is an intervention that may alter inappropriate pain beliefs and enhance coping skills. The purpose of this case report is to describe a multimodal treatment approach utilizing TNE, manual physical therapy (PT) and exercise in a patient with CLBP.

**Description:** A 25 y/o female presented to physical therapy with a six year history of CLBP. Prior PT and chiropractic utilizing spinal manipulation, exercise and passive modalities with no specific educational intervention were
unsuccessful. Her chief complaint was central lower lumbar pain with radiation into the left lower extremity and inability to assume a supine position for six years. Physical examination demonstrated hyperalgesia throughout the lumbosacral region, active extension sensitivity and adverse neural tension. Numeric Pain Rating Scale (NPRS) was 10/10 in supine and 5/10 in standing. The Oswestry Disability Index (ODI) was 24%. The STarT Back was 4 (subscale 2). She reported an 8/24 on the Fear Avoidance Beliefs Questionnaire Physical Activity subscale (FABQ-PA). During six visits over 62 days, TNE was used to de-escalate fear/catastrophization and de-emphasize pathoanatomical explanations for pain. Treatment also included graded exercise (cardiovascular, strengthening, neuromotor) and manual therapy directed at the hip, thoracic and lumbar regions.

**Outcomes:** At discharge and six week follow-up, the patient reported that she was now able to maintain supine positioning. Her NPRS was 1/10 at worst. The ODI improved to 2% and the STarT Back 1 was now 1 (subscale 1). Her FABQ-PA was now 5/24.

**Discussion - Conclusions:** Despite prior unsuccessful multimodal intervention, this patient achieved minimal clinically important difference improvements on outcome measures. The addition of TNE may enhance the benefits of multimodal PT.

**KEYWORDS:** therapeutic neuroscience education, chronic pain.