Resident Literature Review: September 2016

Effectiveness of Global Postural Re-education in Patients With Chronic Nonspecific Neck Pain: Randomized Control Trial. Pillastrini P, et al. Physical Therapy. 2016

Review Submitted by: Justin Bittner PT, DPT

The purpose of this randomized control trial was to compare the effectiveness of applying a treatment known as global postural re-education to the use of manual therapy when treating patients with chronic non-specific neck pain.

Ninety-four patients met the inclusion and exclusion criteria to be included in the study. The outcome measures utilized were pain intensity with the VAS, disability with the NDI, cervical ROM, and kinesiophobia with the Tampa Scale. Forty-seven patients were allocated into each treatment group. One group received one hour of global postural re-education therapy while the other received one-hour of manual therapy. All treatments were one-to-one care and additionally all participants were given a home exercise program to perform. All outcomes were measured prior to the first treatment, following the intervention (9 treatment sessions), and at a 6-month follow-up.

The study demonstrated significant improvements in both treatment groups at time one (post intervention). Improvements at the 6-month follow-up were less significant but demonstrated significant superiority of global postural re-education compared to manual therapy. I find the results interesting, in that, although improvements were demonstrated following the 9 treatment session, mean scores on all the outcome measures return to near baseline at 6-months for pain, disability and kinesiophobia. Also, although randomly allocated into groups, the group that received global postural re-education had a greater pain, disability and kinesiophobia. This could have potentially led to a greater potential to show improvement following intervention and at 6-month follow-up.

The authors' conclusions are that global postural re-education is more effective than manual therapy at reducing pain and disability at 6 months for patients with chronic nonspecific neck pain.

The manual therapy utilized in this study was non-specific traction for 15 minutes, PA mobilizations at each cervical level for 30 minutes, and therapeutic massage over the neck and shoulder for 15 minutes. Most manual therapists do not treat neck pain in this manor as significant research supports the use of manual therapy in conjunction with exercise. An article by Peterson et al. in JMMT 2015, supported the use tailored manual therapy and therapeutic exercise based on the patient's specific limitations which in this case was not performed. Additionally, I think it was a mistake to not treat the thoracic spine by either mobilization or manipulation within the one-hour manual therapy treatment. Mainly because most chronic neck pain cases are associated with upper quarter crossed muscle imbalances leading to increased thoracic kyphosis and forward head posture, increasing the importance of addressing the thoracic spine. This could also be why therapy addressing the global posture of a patient with chronic neck pain could be more beneficial than the manual therapy utilized in this study.

Harris JD, Pedroza A, Jones GL, The MOON Shoulder Group. Predictors of Pain and Function in Patients With Symptomatic, Atraumatic Full-Thickness Rotator Cuff Tears: A Time-Zero Analysis of a Prospective Patient Cohort Enrolled in a Structured Physical Therapy Program. *Am J Sports Med*. 2012:40(2):359-366.

Review submitted by Nicolas Hoover

Purpose: To determine which factors correlate with pain and loss of function in patients with symptomatic, atraumatic full-thickness rotator cuff tears who are enrolled in a structured physical therapy program. Study Design—Cross-sectional study; Level of evidence, 3.

Methods: A multicenter group enrolled patients with symptomatic, atraumatic rotator cuff tears in a prospective, nonrandomized cohort study evaluating the effects of a structured physical therapy program. Time-zero patient data were reviewed to test which factors correlated with Western Ontario Rotator Cuff (WORC) index and American Shoulder and Elbow Surgeons (ASES) scores.

Results: A total of 389 patients were enrolled. Mean ASES score was 53.9; mean WORC score was 46.9. The following variables were associated with higher WORC and ASES scores: female sex (P = .001), education level (higher education, higher score; P <.001), active abduction (degrees; P = .021), and strength in forward elevation (P = .002) and abduction (P = .007). The following variables were associated with lower WORC and ASES scores: male sex (P = .001), atrophy of the supraspinatus (P = .04) and infraspinatus (P = .003), and presence of scapulothoracic dyskinesia (P < .001). Tear size was not a significant predictor (WORC) unless comparing isolated supraspinatus tears to supraspinatus, infraspinatus, and subscapularis tears (P = .004). Age, tear retraction, duration of symptoms, and humeral head migration were not statistically significant.

Conclusion: Nonsurgically modifiable factors, such as scapulothoracic dyskinesia, active abduction, and strength in forward elevation and abduction, were identified that could be addressed nonoperatively with therapy. Therefore, physical therapy for patients with symptomatic rotator cuff tears should target these modifiable factors associated with pain and loss of function.

Comments: This article provides evidence of the ability of conservative treatment for symptomatic rotator cuff tears to reduce pain and improve function. At the very least, the conclusions provide a list of objective asterisks that have been associated with improved outcomes following conservative treatment across a wide age range in both sexes, regardless of race. Statistical analysis seems thorough and accurate enough to apply this clinically although the exclusion criteria in this study decreases the applicability to a large number of patients that may present for PT care. Although the ASES and WORC outcomes measures provide subjective information regarding pt PLOF, it is unclear if the pt's desired activity level upon recovery will be sustained with successful treatment of these specific factors. The study also does not provide the specific outline and treatment progression utilized in PT care that resulted in improvement of these factors which limits the applicability.

Plaza-Manzano, Gustavo, et al. "Manual therapy in joint and nerve structures combined with exercises in the treatment of recurrent ankle sprains: A randomized, controlled trial." ***Manual Therapy*** **26 (2016): 141-149.**

Review Submitted by Erik Lineberry

Objective: To analyze the effects of proprioceptive/strengthening exercises versus the same exercises and manual therapy including mobilizations to influence joint and nerve structures in the management of recurrent ankle sprains.

Methods: 54 patients (39 males, 17 females) with the age range of 20-38 years were included in the study. Groups were randomly allocated to 2 groups that each received a 4-week exercise program with one group also receiving a manual therapy intervention that included talocrural distraction, PA talocrural mobilization, AP talocrural mobilization, PA distal tibiofibular mobilization, and superficial peroneal nerve neurodynamic mobilization.

Results: The study found that VAS pain score decreased by -1.0(-1.6, -0.8) in the control versus -3.2 (-3.8, -2.6) in the experimental group post treatment and -2.0 (-2.9, -1.7) in the control versus -4.4 (-5.0, -3.5) in the experimental at the follow-up. The CAIT scores changed by 4.3 (2.7, 5.9) in the control versus 10.2 (8.6, 11.8) in the experimental group post treatment and 5.9 (4.1, 7.7) in the control and 12.6 (10.7, 14.5) in the experimental at follow-up.

Conclusions: The addition of manual mobilization on the ankle to a proprioceptive and strengthening exercises elicits lower pain levels, reduced self-reported functional ankle instability, greater ankle strength, lower pain pressure threshold, and greater active ROMs in patients with recurrent ankle sprain.

Commentary: This study shows significant improvements for every measure taken to compare these groups. This adds to a body of literature showing the benefit of manual therapy for ankle sprains. This article varies from most others I have seen in that it focused on chronic ankle instability and recurrent sprains instead of treatment for acute or subacute sprains. One area the study lacks in is their follow-up as it was actually unclear if it was 1-week follow-up or 1-month follow-up when comparing the text to the data tables. Another weakness with how the follow-ups were performed was that the study did not actually measure if it decreases future ankle sprains in these patients even though the interventions did improve a number of the patients' impairments.

Oostendorp RA, Elvers H, Mikolajewska E, et al. Cervico-cephalalgiaphobia: a subtype of phobia in patients with cervicogenic headache and neck pain? A pilot study. J Man Manip Ther. 2016;24(4):200-9.

Pubmed link: https://www.ncbi.nlm.nih.gov/pubmed/27582619

Review Submitted by: Scott Resetar, PT, DPT

Objective: The objectives of this study were: (1.) To provide a working definition of cervico-cephalalgiaphobia (fear of cervicogenic headache); (2.) To develop a set of indicators that might signal someone has fear of cervicogenic headaches that is relevant to the patient; (3.) To test these indicators in practice in order to determine the frequency of cervico-cephalalgiaphobia among patients with cervicogenic headaches in manual therapy primary care practices.

Methods: There were 2 phases of the study. Stage 1 was the development of the working definition of cervico-cephalalgiaphobia by an expert group of 10 people from diverse fields. Stage 2 was testing of that definition. None of the experts participated in stage 2. They eventually enrolled 64 therapist who completed a practice screening to collect data on their patients with headaches. These therapists were asked to collect data on patients who meet these inclusion criteria for cervicogenic headache. (1) aged between 18 and 50 years; (2) experiencing headaches for longer than 6 months; (3) unilateral or unilaterally dominant headache without side shift; (4) headache associated with ipsilateral neck, shoulder, or arm pain; (5) pain beginning in the neck; (6) headache aggravated by neck movement or postures; (7) pressure pain over the upper cervical/occipital region; (8) associated with restricted neck range of motion; (9) headache episodes of varying duration and (10) previously treated with manual physical therapy

Results: 112 patients with headaches were screened. 48 were diagnosed with cervicogenic headache.

Table 1 Content validity values, frequency and percentage scores for eight indicators of cervico-cephalalgiaphobia in patients with cervicogenic headache (CHE) (*n* = 46)

Indicators cervico-cephalalgiaphobia	CVR	Never *n* (%)	Sometimes *n* (%)	Often/always *n* (%)
Increased use of medication with insufficient effect	0.6	3 (6.5)	39 (84.8)	4 (8.7)
Short-term positive results in previous manual physical therapeutic treatment	0.8	14 (30.4)	32 (69.6)	
Long-term positive results in previous manual physical therapeutic treatment	1.0	36 (78.2)	5 (10.9)	5 (10.9)
Shorter interval between treatments	0.8	12 (26.1)	34 (73.9)	
Fear of increase in headaches	1.0	8 (17.4)	38 (82.6)	
Fear of 'locked' facet joints of the neck*	1.0	15 (32.6)	31 (67.4)	
Confirmation of 'locked' facet joints of the neck by manual physical therapist (MPT) as a cause for increase in headache	1.0		46 (100)	
More frequent manipulation of the neck	0.8	9 (19.6)	37 (80.4)	

CVR: Content validity ratio (−1: perfect disagreement; +1: perfect agreement; 0: level of 50% agreement of content validity).
* Operational definition of locked facet joint: impairment of joint mobility (decreased movement of facet joint) and pain, diagnosed via a hands-on examination by a physical therapist specialised in spinal manual therapy

Conclusions: The authors state that all of the indicators listed in Table 1 have good content validity, and we should look for these factors in our patients. They do not give a frequency for fear of cervicogenic headache, only stating that it is common. This study is an initial step in the development process of indicators that need to be further tested for reliability and validity in addition to being sensitive to change, acceptable, feasible, and communicable. Of note, the authors wish to convey the importance of the reciprocal relationship between patient and therapist, who may also experience attitudes and beliefs about phobic headache and pain cognitions that subsequently initiate

more frequent treatment sessions and shortening of the time interval between sessions. This therapist-oriented phobia may cause an iatrogenic worsening of the phobia in patients and may consequently negatively affect the course of cervico-cephalalgiaphobia over time in spite of frequent manual therapy.

Commentary: Cephalalgiaphobia was previously well documented in patients with migraine headaches, who will use medication despite the fact that they do not have a headache as a "just in case" measure. We can see here that there appears to be a similar condition for those with cervicogenic headache. You can see from the table that a few of these indicators of fear are actually therapist generated! "confirmation of locked facet joints", "more frequent neck manipulation", and "shorter interval between visits" are all, ultimately, determined by the PT. The authors note the importance of central sensitization as a pain generating or sustaining factor in these patients. Similar to the work of O'Sullivan, I think that this paper shows we need to be careful about the language we use regarding impairments, and strive to not perpetuate a fear cycle in our patients. I think this is an interesting study, and I hope they move forward with this line of research to determine the specifics.

Warby SA, Pizzari T, Ford JJ, Hahne AJ, Watson L. Exercise-based management versus surgery for multidirectional instability of the glenohumeral joint: a systematic review. *Br J Sports Med*. 2016;50(18):1115-1123. doi:10.1136/bjsports-2015-094970.

Review Submitted by Katie Stokely PT, DPT

Objective: The primary objective of this systematic review was to compare conservative, exercise-based rehabilitation to surgical management of patients with clinically diagnosed glenohumeral multidirectional instability (MDI). A secondary analysis was done to determine the exercise and operative protocols implemented as well as their associated adverse effects.

Methods: Articles reviewed included randomized and non-randomized studies of participants with clinically identified MDI of the glenohumeral joint. MDI was defined as a positive sulcus sign or inferior laxity, and a positive load and shift test or positive apprehension reported by a physiotherapist, medical doctor or surgeon. Data extracted from a literature search were included for analysis if selected by two independent reviewers and analyzed using a customized quality assessment tool that examined study bias, classification of clinically diagnosed MDI, intervention procedure, and outcome tools utilized. Evidence was evaluated based on the GRADE approach and guidelines set forth by the Cochrane Collaboration.

Results: Twelve articles were identified for analysis; of these, four met the criteria for inclusion. Three studies performed an inferior capsular shift for surgical intervention, and the last study did not report the surgical operation performed. For all studies, exercise-based interventions were difficult to extract and poorly defined. All studies had a moderate to high risk of performance, detection, selection, and reporting bias. A meta-analysis of data was not appropriate secondary to heterogeneous populations between subject groups, participant characteristics, intervention methods, and outcome measures assessed. All studies found some improvement in long-term impairment-based outcome measures following surgical management. Analysis of patient reported functional outcome measures revealed conflicting results; two studies found long-term follow-up improvement with exercise-based management for the constant score and Subjective Shoulder Rating. However, the same studies found conflicting Rowe score results, which looks at similar domains. The overall results of surgery versus conservative treatment were difficult to determine due to the very low grade of evidence for all outcome measures.

Conclusion: Analysis of data revealed very low quality evidence supporting the use of surgical management over conservative rehabilitation for glenohumeral MDI with respect to functional impairment improvement. Conversely, exercise-based rehabilitation is favored over surgery with regards to patient reported satisfaction. The lack of quality evidence and outcome measure data prior to intervention in some studies makes it difficult to determine the most effective treatment method as well as the benefits and harms of these interventions. Randomized control trials are needed to compare the effect of exercise versus surgical management for glenohumeral MDI.

Commentary: The lack of a standardized classification system or definition of clinically diagnosed glenohumeral MDI makes interpretation of gathered data difficult due to the heterogeneity of participants and the uncertainty of the effects of secondary undiagnosed pathologies. The absence of intervention descriptives makes it difficult to determine their ability to be compared or their effectiveness. As clinicians, it is important to recognize that the use of a heterogeneous population and very low quality evidence ratings of the reviewed articles make it difficult to draw conclusions on effectiveness of exercise-based versus surgical management of glenohumeral MDI. Patient history and clinical assessment must be taken into account when determining an appropriate course of treatment that is patient specific. Furthermore, this article highlights the need to use standardized outcome measures that are sensitive to change and patient specific prior to and following treatment to determine their effectiveness in the clinical setting.

Neal M, Fleming N, Eberman L, Games K, Vaughan J. Effect of Body-Weight-Support Running on Lower-Limb Biomechanics. J Orthop Sports Phys Ther. 2016;46(9):784-93

Review submitted by: August Winter, PT, DPT

Objective: Determine the effects on lower body joint kinematics, kinetics, and spatiotemporal gait variables when running using a lower body positive pressure treadmill (LBPP) at varying levels of body weight support (BWS).

Methods: 14 healthy male recreational runners underwent VO_2 max testing and a familiarization training session with an AlterG treadmill. A third session included data collection for 3 velocities (60, 70, and 80% VO_2 peak) and 5 levels of BWS (0, 20, 40, 60, 80%). Data were collected for each trial for 1 minute, with 3 minutes of recovery between trials. Kinetic data and calculation of spatiotemporal patterns were recorded through a plantar pressure device. Kinematic data were recorded through twin-axis electrogoniometers at the knee and ankle. Initial contact, toe-off, stride frequency, stride duration, absolute ground contact time (GCT), normalized ground contact time (GCT/stride duration) and force to the segments of the feet were identified.

Results: Increasing BWS resulted in increases in stride duration and a decrease in stride frequency (20% versus 40% BWS), as well as decreases in GCT and normalized GCT(0% versus 40%, 20% versus 60%). At the ankle, peak dorsiflexion, overall ankle ROM, and time to peak dorsiflexion all were reduced with increasing BWS(0% versus 40%). At the knee, significant effects were found for knee flexion at toe-off, peak knee flexion, total ROM, and time to peak knee flexion (0% versus 40%). In the foot, peak force to the rearfoot and midfoot was decreased with increased BWS (40% versus 80%). Mean force to all foot segments was also reduced for some of the BWS conditions (0% versus 60%, 20% versus 60%).

Conclusions: Running at 40% or greater BWS results in changes in ankle and knee ROM in stance and alters spatiotemporal patterns of the gait cycle during running. Even greater amounts of BWS can alter foot striking pattern from rearfoot to forefoot striking.

Commentary: This article highlights the gait alterations that occur when running at higher levels of BWS on a device such as the AlterG. These findings are in contrast to previous investigation of the subject (Mercer et al 2015), and to the reported clinical use of BWS treadmill with levels of support up to 50% (Tenforde et al 2012). The main take-away from this article is that clinicians must remain conscious of potential alterations in running mechanics when using a LBPP treadmill, especially at higher levels of support. Clinicians may need to pay special attention to over striding and changes in foot strike pattern, both during the early rehabilitation process and once overground training has been initiated later on. Of course for a patient with a musculoskeletal injury running mechanics may be altered anyways due to pain or fear of reinjury, and would need to be addressed regardless of the use of BWS or not. The primary weakness of this study was the limited amount of time each subject was exposed to the AlterG and the limited time of each trial condition. As the authors suggest, longer running bouts or total amount of exposure time may result in a normalization of running mechanics. Future studies should assess the risk of re-injury for a common injury such as a lateral ankle sprain when initiating running overground versus on an AlterG.