Oksana

The Effect of Velocity of Joint Mobilization on Corticospinal Excitability in Individuals With a History of Ankle Sprain

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The purpose of this study is to investigate the differential effects of low-velocity mobilization compared to high-velocity thrust on corticospinal excitability of the tibialis anterior and the gastrocnemius at rest and submax contraction for patients with chronic ankle sprains.

Methods: 30 patients with a history of ankle sprains 18-60 yo, ankle sprains sustained within 2 weeks, and <28/48 on the Ankle Joint Functional Assessment Tool (AHFAT). Exclusion criteria: + Ottowa ankle rules, + anterior drawer and talar tilt, previous history of ligament or boney reconstruction surgery, concomitant injury to other LE joints, medical conditions contraindicated for mobs/ manips, didn't meet the TMS safety criteria.

It was found that the tibialis anterior had increased activation at rest and post activation after a thrust manipulation. However, there was no significant change following dorsiflexion/ dynamic balance post intervention. The study population were largely asymptomatic and did not have a large impaired ROM or dynamic balance which could have influenced functional results. Another interesting finding was that excitability increased in the TA but not the gastroc. This could be due to the TA depending more on the stretch reflex as compared to the gastroc during gait.

Why do we care about corticospinal excitability? It has been found that this excitability increases motor leaning tasks which may represent the potential for improved learning and skill. This is perfect before training a patient on specific functional activities. Now if a patient is contraindicated for thrust techniques a mobilization technique could still be used. The prolonged load on musculotendinous structures have a positive effect on excitability but not to the degree of thrusting.

Laura

Instruction and feedback for conscious contraction of the abdominal muscles increases the scapular muscles activation during shoulder exercises

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A new study has been published in the Journal of Manual Therapy measuring surface electromyographic (EMG) activity of multiple scapular control muscles and the influence of abdominal activation. Specifically, the three regions of the trapezius musculature and the serratus anterior were activated with and without concurrent abdominal contraction, targeting the rectus abdominus, external oblique, and internal oblique musculature. This is the first study measuring the influence of conscious and active abdominal activation with static and dynamic shoulder exercises with low upper trapezius (UT)/serratus anterior (SA) ratios.

The participants were healthy, young, and had no previous musculoskeletal conditions of the shoulder complex. The scapulothoracic musculature were activated using commonly used exercises based on the literature supporting UT/SA ratio <1 and scapular motor control improvement. These exercises included the Inferior Glide, Isometric Low Row, Wall Slide, Wall Press, and Knee Push-Up; the first two exercises as static, isometric contractions of five second durations and the last three as dynamic

exercises of three second duration for each concentric and eccentric phase. The abdominal musculature were active contracted with study experimenters facilitating the contraction with use of verbal cueing during the expiratory phase of breathing, specifically “tighten the abdomen”, “focus your effort on the abdomen”, and “embrace the low back spine with your abdomen”. The experimenters also used light tapping on the abdominal fibers as tactile feedback.

The results demonstrated a significant increase in serratus anterior EMG activity during the static exercises (Inferior Glide and Isometric Low Row) with active abdominal contraction, despite no significant increase or decrease of activation with any of the trapezius regions. These changes demonstrated a moderate to large effect size of the abdominal contraction only for the serratus anterior, also despite the high activation of middle and lower trapezius during the exercise in itself. The dynamic exercises showed a significant increase in activation of all scapulothoracic musculature with abdominal contraction, although effect sizes were significantly higher with serratus anterior musculature compared to all trapezius regions.

The authors did not comment on the activation rate of the abdominal musculature during any of the exercises, although the pattern is worth noting. The internal oblique clearly had the largest increase in EMG activity with all exercises, starting with the highest activation measurements before and during concurrent abdominal contraction, as well as the clear difference between left and right sides. The external oblique falls into a close second, with also demonstrating large effect sizes with abdominal contraction. It is not clear, however, on the reasoning or significance of this difference, or its relationship to any other factor including arm dominance and body position during the exercises. It can be suggested that with the abdominal contraction during the exhalation, the internal and external obliques serve as an antagonist to the diaphragm and is facilitated more through active exhalation, although this can be only speculated from previous literature.

The study has important clinical significance, although requires limitations. The use of abdominal contraction influences the activation of the serratus anterior musculature during static and dynamic exercises in healthy, pain-free participants. The serratus anterior serves an important function during scapular motion into elevation and weakness can contribute to a spectrum of scapular dyskinesia and loss of scapular stabilization. According to the results of this study, abdominal contraction can facilitate activation of the serratus anterior musculature during both isometric and dynamic exercises. The outcomes of this study are isolated to EMG activity only and we cannot transition these results into functional outcomes or pain modification, however can be utilized during performance of exercises to enhance muscle activation. Further study on effects of these activation patterns on participants with pain or specific pathology would be an appropriate progression for this research and improve clinical applicability.

Nick

Sizer PS, Mauri MV, Learman K, Jones C, Gill N, Showalter CR, Brismee JM. Should evidence or sound clinical reasoning dictate patient care? J Man Manip Ther. 2016; 24(3):117-119

In this opinion paper of sorts, the authors begin by citing that although the evidenced based practice model is composed of research integration, clinical expertise, and patient values and circumstances, it has been the published research domain that has recently exploded and received a greater deal of attention. They comment that although systematic reviews and meta-analysis' provide the "highest" levels of evidence, giving the clinician great confidence in their findings, the results are often non conclusive and are not specific to individualized patients.

In opposition to mere adherence to published evidence, authors propose a framework of practice embodied in the Evidence-Supported Practice wheel that is focused on the individual patient surrounded by the clinicians observations, judgments, and sound clinical reasoning. The "spokes" of the wheel that support appropriate behavior are various forms (e.g., randomized controlled trial, case study/series, meta-analysis, etc..) and domains (anatomy, pathophysiology, biomechanics) of evidence. Biopsychosocial factors comprise the "rim" of the wheel and serve as foundational elements. Finally, the clinicians systematic approach to management forms the "tire" of the wheel – the mode of delivery to the patient.

The authors propose several advantages to their framework and model. First, each level of evidence is appropriately assessed and utilized without undue prioritization to the traditionally "higher" levels of evidence. Moreover, the biospychosocial factors that serve as the rim of the wheel are often not considered or captured in contemporary research publications. Finally, the clinician is urged to trust their own well informed clinical reasoning and judgments as opposed to only adhering to published evidence. In conclusion, the authors call for the therapist's expertise and patient values to receive greater attention in opposition to sole reliance upon published evidence.

Alex

Baumgarten KM, Osborn R, Schweinle WE, Zens MJ, Helsper EA. **Are Pulley Exercises Initiated 6 Weeks After Rotator Cuff Repair a Safe and Effective Rehabilitative Treatment? A Randomized Controlled Trial.** Am J Sports Med. 2016;44(7):1844-51. DOI: DOI: 10.1177/0363546516640763

This study examines the use of pulleys as part of RCR rehab in comparison to graded active assisted range of motion exercises (Jackins exercises) six weeks after surgery. All patients received pain free passive ROM for the first six weeks and were then divided into the two groups.

The authors hypothesized that including pulleys into the rehab program six weeks after surgery would have negative effects on outcomes due to increased supraspinatus activation during the exercise (as measured by EMG). Furthermore, the authors expected to see increased scapular compensatory patterns during overhead movement, as well as inferior outcomes in regards to ROM and strength in the experimental group.

The results of this study did not support the authors' hypothesis and in fact, do not demonstrate statistically significant differences in regards to subjective and objective outcome measures between the two groups after 52 weeks. The protocol used included progressive scapulothoracic and rotator cuff strengthening and motor control exercises (Appendix A), similar to most standard RCR protocols.

The authors state that this study is the first to closely examine the effect of incorporation of pulleys into RCR rehab and that previously, use of pulleys was based on expert opinion, experience and EMG studies. It would have been interesting to see if doing neither pulleys nor the Jackins exercises would have made a difference in regards to outcomes.

Sean

Greater vertical impact loading in female runners with medically diagnosed injuries: a prospective investigation

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Davis IS, et al. Br J Sports Med 2016;50:887–892. doi:10.1136/bjsports-2015-094579

There is a growing population of folks trying to make a turn to make healthier decisions, exercise and be more active. Probably the most popular, easiest and least expensive way to do this these days is to run. I see more and more people at our clinic starting to run for exercise for the first time in their life. It is amazing to see people being more active and improving their fitness. Unfortunately, many of these individuals are injuring themselves. At our clinic, running related injuries are seen more frequently than low back pain.

The purpose of this study was to determine whether runners with high impact loading are at greater risk for developing medically diagnosed injuries. This prospective study compared variables related to impact peak of rearfoot strike runners who go on to develop injury to those who have never been injured and aimed to calculate the odds of developing an injury based on high impact loading.

Participants were between the ages of 18 and 40 years and run at least 20 miles per week and currently injury free and for the past 6 months. Gait analysis measured vertical average loading rate, vertical impact peak, peak vertical force and instantaneous loading rate. After the initial data collection the participants were followed for 2 years and injuries requiring medical attention were recorded.

Of the 249 participants, 58% sustained medically diagnosed injuries. It was determined that there was a significant difference in vertical impact peak and vertical average loading rate between the injured and uninjured runners.

This study further supports vertical loading as a contributing factor to running injuries and the need to educate patients and implement strategies to decrease vertical loading impact forces.