Sodha S, Srikumaran U, Choi K, Borade A, McFarland E. Clinical Assessment of the Dynamic Labral Shear Test for Superior Labrum Anterior and Posterior Lesions. *Am J Sports Med*. 45(4): 775-781.

Review Submitted by Nicolas Hoover

Purpose: (1) to assess the clinical utility (ie, sensitivity, specificity, positive predictive value, negative predictive value, odds ratio, and diagnostic accuracy) of the DLST for detecting isolated SLAP lesions (ISLs); (2) to determine the clinical utility of the DLST in the shoulders of patients who have SLAP lesions with coexisting abnormalities; and (3) to determine whether using the DLST with other common physical examination tests for SLAP lesions increases the clinical utility of the test.

Methods:

INCLUSION: For inclusion, patients must have undergone a physical examination consisting of 4 tests and diagnostic arthroscopy. 774 patients were included in this study. 9 had an isolated SLAP lesion, and 155 had a SLAP lesion with a concomitant abnormality. The remaining 610 patients without a SLAP lesion were considered the control group.

All study patients had a standardized preoperative visit within 4 weeks before surgery. During this evaluation, patients completed a detailed standardized questionnaire, underwent a standardized physical examination including commonly used tests to evaluate SLAP lesions, as well as measures of shoulder range of motion, strength, and laxity, and had preoperative shoulder radiography.

DLST: The test was performed with the examiner behind the standing patient, holding the wrist of the patient with 1 hand and applying an anteriorly directed force on the proximal humerus near the joint line with the other hand. The patient was instructed to relax and to not resist the motion in any manner. The patient's arm was then elevated in the plane of the body from the side to maximal abduction. A test was considered positive when the patient reported pain or the examiner felt a click in the patient's posterior joint line between 90 and 120 of elevation.

ADDITIONAL TESTS: Active compression test, Relocation test, Resisted lift-off test

SLAP DIAGNOSIS: Type II through IV were considered positive for this study while a type I lesion was considered to be a degenerative lesion only and therefore a negative examination.

RESULTS:

The DLST was positive for 242 of 610 patients (40%) in the control group, 7 of 9 patients (78%) in the ISL group, and 88 of 155 patients (57%) in the CSL group.

The most sensitive tests were the DLST (78%) and the active compression test (78%), followed by the lift-off test (56%) and the relocation test (33%).

The most specific test was the relocation test (78%), followed by the DLST (51%), the lift-off test (50%), and the active compression test (24%).

The likelihood ratio was highest for the DLST (3.54), followed by the relocation test (1.74), the liftoff test (1.30), and the active compression test (1.08).

There was no increase in the odds ratios for these tests when they were used together in various combinations.

CONCLUSION:

This study shows that the DLST has some clinical utility in making the diagnosis of ISLs. However, the high sensitivity and low specificity suggest that the DLST cannot reliably distinguish SLAP lesions from other shoulder abnormalities, such that the results of the DLST must be interpreted with caution. The utility of the DLST did not increase when it was combined with other commonly used tests for SLAP lesions, especially when other abnormalities were present.

COMMENTS:

Although this study demonstrates moderate psychometric data supporting the use of the DLST, further studies are necessary. The results indicate that the DLST is better at ruling out isolated SLAP lesions compared to SLAP lesions with concomitant injuries when used alone. Combining all 4 labral tests for isolated SLAP tears and labral tears with concomitant injuries resulted in 91% specificity but the +LR was poor (1.28 and 1.01) This study utilizes diagnostic arthroscopic surgery for determining status of SLAP lesions, which reduces the clinical applicability as well. Further testing with more specific demographic specificity may provide a more accurate representation of the clinical applicability of this test. Overall, I think it is worthwhile to include this test in screening for labral tears, but only in combination with other tests and not as a stand-alone.

Monthly Literature Review

Fernández-de-las-peñas C, Cleland J, Palacios-ceña M, Fuensalida-novo S, Pareja JA, Alonso-blanco C. The Effectiveness of Manual Therapy Versus Surgery on Self-reported Function, Cervical Range of Motion, and Pinch Grip Force in Carpal Tunnel Syndrome: A Randomized Clinical Trial. J Orthop Sports Phys Ther. 2017;47(3):151-161.

Review submitted by: August Winter, PT, DPT

Objective: A recent Cochrane review found limited evidence for the use of joint mobilization and exercise for carpal tunnel syndrome (CTS). Similarly, the American Academy of Orthopedic Surgeons released guidelines suggesting greater benefit for surgery versus conservative management at 6 and 12 months. Within this context the purpose of this study was to compare the short and long term effectiveness of manual therapy and surgery for symptom severity, self-reported function, pinch grip strength, and cervical ROM in women with CTS.

Methods: 100 subjects were included with the following criteria: symptoms at least 12 months, EMG confirmed sensory and motor conduction deficits, symptoms in the median nerve distribution, and positive Phalen and Tinels signs. Patients with deficits in the ulnar or radial nerve distribution, those with diabetes, or other comorbid musculoskeletal conditions were excluded. The physical therapy intervention involved 3 sessions of 30 minutes involving manual therapy directed at the cervical spine (CPAs, lateral glides) and soft tissue intervention to any area of potential median nerve entrapment. Patients in both groups were also given a cervical spine stretching program. Outcomes were assessed at baseline, and 1, 3, 6, and 12 months post-intervention. Outcomes included the Boston Carpal Tunnel Questionnaire (BCTQ), cervical ROM as measured by a CROM device, and pinch tip grip force.

Results: At one month the manual therapy patients had statistically greater function per the BCTQ compared to the surgical group, although changes were similar at all other follow ups. Both groups had similar improvements in symptom severity per the BCTQ at all follow ups. The manual therapy group had higher increases in pinch grip force at one month but improvements at all other time points were similar between the groups. No improvements in cervical spine ROM were seen in either group. While there were greater improvements at one month for the manual therapy group, these did not exceed the MCID and MDC for self reported function and pinch grip respectively.

Conclusions: A short course of manual therapy based physical therapy has similar improvements to CT release surgery, but has better outcomes early on. The course of manual therapy and cervical spine stretching did not result in improved cervical ROM.

Commentary: Given the apparent lack of well done research studies supporting manual therapy for the treatment of CTS, this study provides strong evidence for the equivalent improvement between physical therapy and surgery for this patient population. Unlike many research studies which have unrealistic session lengths or number of visits, this study utilized only 3 sessions of thirty minutes to provide a similar benefit compared to surgery. This is encouraging, as in clinical practice we likely would see this patient for

much longer, potentially to greater benefit. I would have liked to have seen a cost analysis to further put into focus the differences between surgery and therapy in this population. Given the talk about return to work and lost productivity in the introduction I also am fairly surprised that this study did not look at this variable as a secondary outcome, further adding to the possible economic ramifications of surgery versus therapy. I would have liked to have seen a component of postural education or postural strengthening exercises as part of the HEP, as this likely is a relevant aspect of many patients with distal nerve pathology. Overall this well done study provides good evidence when discussing treatment options with patients and with surgeons. As an adjunct to this article there is a JOSPT patient perspective that can be utilized for further patient education.

Ribeiro, D. C., Day, A., & Dickerson, C. R. (2017). Grade-IV inferior glenohumeral mobilization does not immediately alter shoulder and scapular muscle activity: a repeated-measures study in asymptomatic individuals. *Journal of Manual & Manipulative Therapy*, 1–10.

Review Submitted by: Scott Resetar, PT, DPT

Objective: To assess the effects of a grade IV inferior GH mobilization on shoulder and scapular muscle activity in asympomatic subjects. Researchers wanted to look for any carry over from the interventions, immediate efects, and comparison between mobilization and a control condition. The authors feel this is important to establish what is the normal response to a mobilization without any confounding factors of pain or mechanical dysfunction.

Methods: N=22, age 18-40 years old. Repeated measures, cross-over, pre-post intervention study with a convenience sample. Participants were blinded, researchers were not. Participants performed 10 reps of shoulder abduction pre treatment and post for each intervention with surface EMG to record muscle activation levels. The interventions were all performed by the same experienced therapist. Intervention was 3 x 30 seconds of grade IV inferior glide in 90 degrees abduction, neutral rotation. The control intervention was identical, except no glide was performed. There was a 5 minute "wash-out" period between each intervention. Half of participants received the control intervention first, half received the true mobilization first. Primary outcome measure was the muscle activity level as a % of MVIC during the 10 reps of abduction.

Results: **As you can see, the average activation level of each muscle slightly decreased after the intervention vs control, however none of the changes were significant.**

Table 4. Mean differences (95% confidence interval) in muscle activity change following the intervention between control and mobilization conditions for both phases (concentric and eccentric).

Muscle	Concentric phase	Eccentric phase
Upper trapezius	−4.7 (−17.3 to 26.7)	−9.3 (−25.4 to 6.8)
Lower trapezius	−6.2 (−16.1 to 3.6)	−0.2 (−4.6 to 4.3)
Supraspinatus	−17.7 (−52.1 to 16.6)	−11.3 (−37.6 to 15.0)
Infraspinatus	−1.5 (−5.9 to 2.8)	−1.2 (−4.6 to 2.2)
Anterior deltoid	−17.6 (−52.8 to 17.5)	−9.5 (−24.9 to 5.9)
Middle deltoid	−3.1 (−12.1 to 6.0)	−3.4 (−9.2 to 2.4)
Posterior deltoid	−6.4 (−18.5 to 5.6)	−3.4 (−10.9 to 3.6)
Serratus anterior	−9.5 (−27.3 to 8.3)	−8.3 (−18.9 to 2.3)

Note: Negative values = higher muscle activity levels were observed during the control when compared to mobilization condition.

Conclusions: No change in muscle activity was noted after 3 sets of 30 seconds of grade IV inferior mobilizations. This conflicts with previous research showing changes after mobilization.

Commentary: The authors note that it could be possible that they did not dose the duration of mobilization to elicit a response from muscle spindle receptors or golgi tendon organs. The previous studies done on shoulder and hip motion used longer duration (1-2 minutes per set). They noted previous studies have had inconsistent findings on the effects of mobilization. Specifically, one study showed grade IV hip mobilizations led to an increase in hip abductor muscle torque, while two other studies showed reductions muscle activity level.

Another study showed a PA hip mobilization causing a 15% decrease in erector spinae activation. The authors also note that there are known limitations using surface EMG, particularly for supraspinatus, and this may be another limitation or confounding factor to the study.

Richards K, Beales D, Smith A, O'Sullivan P, Straker L. Neck Posture Clusters and Their Association With Biopsychosocial Factors and Neck Pain in Australian Adolescents. Phys Ther. 2016;96:1576-1587.

Review submitted by: Justin Bittner, PT, DPT

Objective: To identify various neck postures amongst a cohorts of 17-year-old adolescents. And to identify if difference neck postures are associated with neck pain and/or biopsychosocial factors.

Methods: A cross-sectional cohort study. A group of 17-year-olds completed a questionnaire that included specific questions regarding neck pain, headache and a variety of psychosocial domains. All subjects underwent testing for height, weight, and were all photographed seated for a sagittal plane view. Each participant had a 2-D photograph taken in the sagittal plane in sitting. Photo reflectors were placed on bony landmarks and 4 angular measurements were obtained of head, neck, and thorax. A plum line was hung so that the distance from vertical could be calculated in addition to the angular measures. Analysis was performed and participants were subgrouped into 4 clusters (upright, intermediate, slumped thorax/forward head, and erect thorax/forward head). Lifestyle and psychological factors, neck pain, and headache were assessed via questionnaire.

Results: Participants grouped in the upright cluster were found to be significantly taller and were found to exercise more frequently. There was no difference between groups when looking at the time spent sitting or using a computer. 282 participants were classified as having mild/moderate depression and cluster 3 (slumped thorax/forward head) demonstrating significantly greater odds of having depression. There was no difference amongst groups when looking at those participants with reported persistent neck pain. Also, there was no difference amongst groups when looking at those participants with reported headaches.

Conclusions: The study identified four neck posture subgroups in a sitting posture. The results support previous studies identifying associations between sitting postures and exercise frequency, BMI, and depression. No support for neck pain and headaches with differences in sitting neck posture in 17-year-old adolescents.

Commentary:
I think this article brings light to the psychosocial aspect of care regarding patients, particularly younger patients, with neck pain. Although there was no group that demonstrated greater odds of having neck pain or headaches; the group that displayed typical forward head posture with increased kyphosis had a significantly higher rate of depression. This should certainly be something we as PT's need to be screening for, as well as, treating with the tools we have and/or referring to additional health care providers for treatment. Understanding that, even if the patient does not report they are depressed on an intake form, we should be doing additional screening as this could negatively be impacting their potential progress with PT.

I also found it interesting that posture did not seem to play a role in this group's neck pain/headaches. I frequently address young adults' posture to help with reducing neck pain. I still feel, biomechanically, posture affects structures that that can lead to neck pain and/or headaches; but this article, certainly, shines a different light on the topic causing me to think of other factors posture can correlate with.

Grimaldi A, Mellor R, Nicolson P, Hodges P, Bennell K, Vicenzino B. Utility of clinical tests to diagnose MRI-confirmed gluteal tendinopathy in patients presenting with lateral hip pain. Br Sports Med. 2017;51:519-524. Doi: 10.1136/bjsports-2016-096175

Review submitted by: Katie Stokely, PT, DPT

Objective: Previous studies have shown pain along the greater trochanter may be the result of gluteus medius or minimus tendinopathy. A recent meta-analysis looking to determine the accuracy of four clinical tests used to diagnose gluteal tendinopathy found that no single clinical test could predict the finding of this pathology on MRI. The aim of this study was to determine the diagnostic utility of gluteal tendinopathy clinical tests on participants with a complaint of lateral hip using MRI as a reference standard.

Methods: This is a diagnostic utility study performed on participants with complaints. Practitioners participating in this study were blinded to each other's results. Participants were of a convenient sample. Inclusionary criteria included people between the ages of 30-70 years old with a complaint of lateral hip pain rated ≥ 4/10 on the NRPS with a symptom duration within the previous three months. Exclusionary criteria included those who had a corticosteroid injection in the hip region within the last 12 months, previous hip or lumbar spine surgery, known neurological disorder or concomitant conditions, or contraindications to MRI. Participants underwent a physical examination for gluteal tendinopathy which included six clinical tests designed to provide tensile and compressive loading to the involved structures. These included FADER, FADER with resisted internal rotation, FABER, passive hip adduction in side lying, hip adduction with resisted hip abduction, single limb stance (SLS), and palpation. A positive diagnosis of gluteal tendinopathy based on clinical examination was positive palpation testing over the greater trochanter and at least one other positive clinical test. Tests were considered positive if they elicited a pain score of >2/10 on the NRPS. Patients then underwent MRI examination.

Results: Results demonstrated the physical examination of participants had moderate sensitivity (60%) and specificity (77%), and high positive predictive value (77%). Palpation of the greater trochanter had the greatest sensitivity (80%) and lowest negative likelihood ratio (0.43). SLS for 30 seconds has largest specificity (100%) with a strong positive likelihood ration (12.2). When resisted muscle contraction was added to FADER and hip adduction, testing the sensitivity and specificity improved suggesting that adding a tensile component to the test improves its accuracy. Palpation had the lowest specificity so should not be relied on as the only testing performed. Stronger correlations would have been made with more participants. Findings also demonstrate that the presence of gluteal tendinopathy on imaging does not always result in pain or dysfunction. Low sensitivity and accuracy show that while participants may have gluteal tendinopathy on their imaging, this may not be the source of their symptoms.

Conclusion: While there are some limitations to this study, results suggest that participants with complaints of lateral hip pain with symptom provocation within 30 seconds of single limb stance are more likely to have gluteal tendinopathy. If lateral hip pain is not provoked by palpation along the greater trochanter, gluteal tendinopathy is more unlikely to be the source of symptoms.

Commentary: The goal of this study was to provide clinicians with information as to what tests would provide the best guidance in determining the presence of gluteal tendinopathy in patients who present with lateral hip pain. Palpation should be combined with another test, particularly SLS, in order to best identify those with gluteal tendinopathy. In patients with lateral hip pain, if palpation is negative, it is more likely they do not have gluteal tendinopathy; however, the

specificity of the test does not allow for the conclusion that the pathology is present. Specific tests that provide tensile and compressive loading are more likely to rule in the pathology; however, if negative cannot rule out the presence of the condition. Utilizing a battery of tests which are both sensitive and specific allow for a more accurate determination of the present pathology. When attempting to confirm or refute differential diagnoses, this study does a nice job of describing the clinical applicability of sensitive and specific tests.

Grooms, D. R., Page, S. J., Nichols-Larsen, D. S., Chaudhari, A. M., White, S. E., & Onate, J. A. (2017). Neuroplasticity associated with anterior cruciate ligament reconstruction. *JOSPT*, 47(3), 180-189.
Reviewed by: Erik Lineberry
Objective: To compare differences in brain activation during knee flexion/extension in persons who have undergone ACLR and in matched controls.
Methods: Fifteen participants who had undergone left ACLR (38.13 ± 27.16 months postsurgery) and 15 healthy controls matched on age, sex, height, mass, extremity dominance, education level, sport participation, and physical activity level participated. Functional magnetic resonance imaging data were obtained during a unilateral knee motor task consisting of repeated cycles of knee flexion and extension.
Results: Participants who had undergone ACLR had increased activation in the contralateral motor cortex, lingual gyrus, and ipsilateral secondary somatosensory area and diminished activation in the ipsilateral motor cortex and cerebellum when compared to healthy matched controls.
Conclusion: Brain activation for knee flexion/extension motion may be altered following ACLR. The ACLR brain activation profile may indicate a shift toward a visual-motor strategy as opposed to a sensory-motor strategy to engage in knee movement.
Commentary: The brain changes that this study reports following ACLR are astounding. I would not have expected the widespread effects a surgery procedure like this would have. This study focused on a specific motion that is out-of-task for the typical patient with ACLR, but I think the findings may be applicable to a wide variety of intervention for ACLR and possibly other conditions. I found it interesting that due to the findings in this study it was suggested to alter visual feedback to initiate quad firing and suggested the internal cueing of "moving the knee" may be ineffective. I tend to use tactile cueing and the "move the knee" or "push the table away" type of cueing and the thought process as to why internal cueing would not be effective makes sense. They no longer have good proprioception, so it will not be easy to initiate firing that way. Using this study's findings, I do not think I will steer away from these techniques but I may reorder my cueing during interventions. I may start with visual feedback, having the patient watch the knee/quad while long sitting or standing at a mirror. Then I may add tactile cueing and remove visual feedback as the study suggests. Finally, added only verbal feedback with internal cueing to retrain proprioception in the knee. To return to PLOF the patient will need to improve their proprioception somehow.