

Added, Marco Aurélio N. et al. "STRENGTHENING THE GLUTEUS MAXIMUS IN SUBJECTS WITH SACROILIAC DYSFUNCTION". *International Journal Of Sports Physical Therapy*, vol 13, no. 1, 2018, pp. 114-120. *The Sports Physical Therapy Session*, doi:10.26603/ijsp20180114.

Review Submitted by: Katie Long, PT, DPT

Objective: To assess the effect of a gluteus maximus focused exercise program in individuals who demonstrate positive clinical testing for SIJ dysfunction.

Methods: Eight subjects were included in the study, 4 males and 4 females. Patient evaluation included trunk and hip ROM, VAS pain assessment, and Oswestry Disability Index scores. Gluteus maximus strength was assessed using dynamometer, Slump test was assessed, Laseque straight leg maneuver, Piriformis test, Grava test, FABER test and Scour test were all performed. SIJ screening included SI compression, SI distraction, Squish, and Gaenslen tests with 3/4 positive testing indicated SIJ Dysfunction. Subjects included in the study had to have unilateral lumbopelvic pain in the SI region for >12 weeks and have received no previous PT intervention. Subjects were excluded if they had clinical and imaging evidence of any spinal or pelvic co-morbidity as a potential cause of their symptoms, no signs of lower limb length discrepancy, or if they had a cognitive deficiency. Subjects attended 10 physical therapy treatments at 2x/week. During the first 5 treatment sessions, they performed the following exercises: bilateral bridging, unilateral bridging, prone hip extension with knee bent to 90 degrees. In the following 5 treatment sessions "fire hydrant" and "deadlift" exercises were added. Gluteus maximus muscle strength was assessed in prone utilizing hand-held dynamometry

Results: Prior to initiating treatment, a significant strength deficit was noted between the asymptomatic side as compared to the symptomatic side. Following treatment intervention, there was a significant increase in gluteus maximus strength on the involved side ranging from 17-29%; however, there was no change noted in strength of the asymptomatic side. A significant decrease in pain as measured by VAS was observed and a significant increase in self-reported function was reported by the Oswestry following 5-week intervention period.

Conclusions: The results of this case series suggests that subjects with persistent lumbopelvic pain and positive SIJ testing may benefit from increased gluteus maximus emphasis during a strengthening program. These results show a significant increase in function and strength with decreased reports of pain following a strength training program directed at gluteus maximus strengthening. The authors suggest that by increasing strength of the gluteus maximus muscle, there may be an increased stabilization of the musculature and fascia surrounding the SI joint by aiding in increasing compressive forces at the SI joint in order to aid in load transfer.

Commentary: This case series highlights the importance of emphasizing gluteus maximus hip extensor training in patients with persistent lumbopelvic pain and positive SIJ testing. It provides support for the concept of increasing stability of the SIJ during force transfer from the LE to the trunk. Patients with persistent lumbopelvic pain often have decreased hip extensor strength and/or range of motion, and this article provides a nice reminder to address these impairments in this patient population. This article also provides a nice educational framework for utilization with patients to emphasize increased adherence to exercise intervention.

Roenz D, Broccolo J, Brust S, et al. The impact of pragmatic vs. prescriptive study designs on the outcomes of low back and neck pain when using mobilization or manipulation techniques: A systematic review and meta-analysis. J Man Manip Ther. 2018;26:3, 123-135.

Review Submitted By: Tyler France, PT, DPT, CSCS

Objective: The objective of this study was to examine the impact of pragmatic versus prescriptive study designs on the outcomes of low back and neck pain when using mobilization or manipulation techniques.

Methods: This systematic review and meta-analysis was performed according to PRISMA guidelines. MEDLINE and CINAHL were searched to identify studies comparing mobilization and manipulation for neck or back pain that met eligibility criteria. The selected articles needed to meet all the following inclusion criteria: written in English, randomized clinical trial, compared mobilization versus manipulation in isolation, included patients with low back pain or neck pain, and used an outcome measure of pain or disability. Eligible studies were classified as pragmatic or prescriptive based on criteria used by Kent et al. To be classified as pragmatic, clinicians needed to be able to choose the technique and spinal levels to be treated. The validity of studies was examined using the Cochrane Risk of Bias tool.

Results: Thirteen studies with a total of 1313 participants were included in the systematic review. 8 studies (61.5%) examined the interventions with a prescriptive approach and 5 studies (38.5%) utilized a pragmatic approach. For most time-points, prescriptive studies found manipulation to be superior to mobilization for both pain and disability. At no time-point did pragmatic designs find a difference between mobilization or manipulation for either pain or disability. When looking at prescriptive studies, manipulation was found to be more effective in the short term (1-4 weeks) and in the long term (3-6 months). There were no significant differences between mobilization and manipulation in pragmatic studies.

Conclusions: When a pragmatic design was used, representing actual clinical practice, patients improved with both techniques with no difference between mobilization and manipulation. When clinicians were prescribed techniques, not representing true clinical practice, manipulation showed better outcomes than mobilization for pain and disability.

Commentary: The authors suggest that the findings of the systematic review and meta-analysis can be attributed to the differences in pragmatic and prescriptive studies, including inclusion criteria, different level of focus on validity, and the method of treatment delivery. The pragmatic approach more closely resembles actual patient care and demonstrates that when clinicians are allowed to use their clinical reasoning and expertise, mobilization and manipulation have similar effects. After reviewing this study, I will certainly be more aware in the future when looking at studies comparing mobilization and manipulation and determining how closely the design mimics actual clinical practice.

Pamukoff D, Montgomery M, Choe K, Moffit T, Gargia S, Vakula M. Bilateral alterations in running mechanics and quadriceps function following unilateral anterior cruciate ligament reconstruction. J Orthop Sports Phys Ther. 2018;1-26.

Review submitted by: Jennifer M. Boyle

Objective: The primary purpose of this study was to compare sagittal plane knee mechanics and vertical GRF characteristics during running between involved and uninvolved limbs of individuals who have undergone ACLR, and to its limbs of a healthy control group. A secondary purpose of this article was to evaluate the association between quadriceps muscle performance isometric peak torque (PT) and rate of torque (RTD) development and the after mentioned running mechanics in the involved limb of persons who have undergone ACLR.

Methods: Thirty- eight participants with primary unilateral ACLR that were matched with thirty – eight control participants. This match was based on sex, age and body mass. Quadriceps muscle performance was assessed with isokinetic and isometric knee extension peak torque (PT) and rate of torque (RTD100 and RTD200). Running evaluation consisting of 5- minute jogging warm up followed by a 20-minute run over a force plate where 3-dimensional running biomechanics were analyzed. An assessment of the knee flexion angle (KFA), knee extension moment (KEM), rate of knee extension moment (RKEM), vertical instantaneous loading rate (VILR) and vertical impact peak (VIP) was collected.

Results: On average, there was a smaller KFA in the involved limb compared to uninvolved limb in the ACLR group. Compared to control group limbs, involved limbs in the ACLR group had lower RTD100, lower PT at 60 sec, lower PT at 180 sec, smaller KFA, lower KEM, lower RKEM, and higher VILR. Compared to control group limbs, uninvolved limbs in the ACLR group had lower RTD100, lower PT at 60 sec, and smaller KFA. For the involved limbs in the ACLR group, there was a low correlation between isokinetic PT at 180 sec and RKEM, and between RTD100 and RKEM. No differences were found in isometric strength for any comparison.

Conclusions: This study found that sagittal plane running mechanics of the involved and uninvolved limbs of individuals after unilateral ACLR are different then control limbs. This study loosely correlates these changes in mechanics to rate of torque development 0-100 ms and isokinetic strength of the quadriceps.

Commentary: After ACLR patients are looking to return to pre -injury levels of physical activities, however, many individuals struggle with return to sport following this surgery. In some cases the impairments that are unresolved post ACLR can lead to decreased ability to perform ADLs, participate in sports and can elevate the risk of re- injury as well as develop post – traumatic knee OA. This article has revealed that improving bilateral quadriceps muscle performance and running biomechanics are necessary following unilateral anterior cruciate ligament reconstruction. I feel like at times the unaffected limb is forgotten about and this article reminds therapists to address bilateral deficits to more readily help post-op ACLR back to pre-surgical activities.

Wellsandt E, Failla MJ, Axe MJ, Snyder-Mackler L. Does Anterior Cruciate Ligament Reconstruction Improve Functional and Radiographic Outcomes Over Nonoperative Management 5 Years After Injury? Am J Sports Med. 2018 Jul;46(9):2103-2112. Epub 2018 Jun 21.

Review Submitted by: Sarah Bosserman, PT, DPT, CSCS

Objective: To determine if differences exist for functional and radiographic outcomes 5 years after patients completed an operative and non-operative treatment of ACL injury, given both complete a progressive criterion-based rehabilitation program.

Methods: 144 athletes with acute ACL rupture, aged 14-55 years old, were used for this cohort study. All subjects participated in level 1 (eg. soccer, basketball) or level 2 (eg. tennis, downhill skiing) cutting and pivoting activities before injury. Patients were excluded if significant meniscal, ligamentous tears, or articular cartilage lesions were present concurrently. Patients were categorized as a “potential copers” or “noncopers” as part of the surgical decision-making process. Patients self-selected treatment strategies, leading to 83 patients who underwent ACL reconstruction and 22 who completed the non-operative treatment. For the 5 year follow-up, functional testing included quad strength, single-legged hop, knee effusion testing, and completion of patient-reported outcomes (KOS-ADLS, GRS, IKDC, KOOS, TSK-11, ACL-RSI, VAS) . Radiographs were also taken of the knee and graded using the Kellgren-Lawrence system.

Results: 105 (72.9%) returned for 5-year testing. A greater proportion of patients treated operatively were participating in level 1 cutting and pivoting activities before injury. After controlling for pre-activity level, groups did not differ in quad strength ($P=.817$) or any of the 4 single-legged hop tests ($P=.234-.955$) at 5 years. 44% of those treated operatively demonstrate knee joint effusion at 5 years vs 10% treated non-operatively. Patients treated operatively reported higher scores on the GRS ($P=.001$) exceeding the MDC. Patients treated non-operatively reported higher levels of fear on the TSK-11 ($P=.035$), and higher worst pain levels on the VAS ($P=.010$), but group differences did not meet the MDC of 2.8. No group differences found for remaining outcome measures. Radiographs were completed for 64 operatively treated patients and 20 non-operatively. Tibiofemoral knee joint OA was present in 23.4% treated operatively and 5% treated non-operatively.

Conclusions: The findings of this study demonstrate positive functional outcomes can occur following a progressive criterion-based rehabilitation program for both operative and non-operative management following ACL rupture in athletes.

Commentary: The discussion in this article focuses on the fact that athletes can return to high levels of activity with both operative and conservative management. The difficulty comes down to determining who would be appropriate for which treatment without further research into reliable clinical algorithms. Positive results for pain and function were found in both groups. However, there were cons with both treatment options, including increased joint effusion and incidence of OA in the operative group versus increased highest pain level and fear in those treated without surgery. In this current study, the operative group was significantly larger, reflecting the current rate of ACL surgeries in the US. Furthermore, participants had minimal concomitant injuries and the mean age was 34.3 ± 11.4 years, making the results less applicable to those with more involved injuries or to high school and college aged athletes involved in level 1 cutting and pivoting activities. Although more research is needed, this study may aid discussion and education between patient and clinician following ACL injury.

Modifiable risk factors for patellar tendinopathy in athletes: a systematic review and meta-analysis.
Sprague AL, et al. *Br J Sports Med* 2018;0:1–12. E pub ahead of print. doi:10.1136/bjsports-2017-099000.

Review submitted by: Justin Pretlow, DPT, OCS

Objective: To perform a systematic review and meta-analysis identifying (1) potential modifiable risk factors and (2) associated modifiable factors for patellar tendinopathy in athletes.

Methods: PubMed, Web of Science, Scopus and Cinahl were searched on Nov. 14, 2017. All quantitative original research comparing athletes with patellar tendinopathy with a control group without the injury were considered. Patellar tendinopathy is defined as symptoms isolated to the inferior pole of the patella. The broader definition of jumper's knee, including symptoms in other sites of the patellar tendon were also included. To clarify, prospective studies can identify potential modifiable risk factors, since presence or exposure to the risk factor is determined prior to the development of patellar tendinopathy. At best, items identified in cross-sectional studies can only be considered associated modifiable factors, since a temporal relationship cannot be established. Of the 31 studies considered, 6 were prospective. All six included young athletes, with mean ages under 30. The majority (83%, 5/6) played either volleyball or basketball, and consisted of elite athletes competing at the professional, national or international level (67%, 4/6). Studies were independently assessed for risk of bias and methodological quality by two reviewers using a modified version of the Newcastle-Ottawa Scale (NOS).

Results: 862 records were screened and 31 articles were included (6 prospective, 25 cross-sectional). There was a lack of strong evidence for any potential modifiable risk factor or associated factors. There was limited or conflicting evidence that decreased ankle dorsiflexion range of motion, decreased posterior thigh and quadriceps flexibility, greater volume of jump training, more volleyball sets played per week, greater countermovement jump (CMJ) height and greater activity volume are potential modifiable risk factors. Meta-analysis supported greater activity volume (Cohen's $d=0.22$, 95% CI 0.06 to 0.39, $p=0.008$), higher body weight (0.36, 0.17 to 0.55, $p<0.001$) and greater CMJ height (0.31, 0.07 to 0.56, $p=0.01$) as associated modifiable factors.

Conclusions: There is a lack of strong evidence for any potential modifiable risk factors or associated factors. Factors with lower levels of support may be of interest in designing prevention programs but require further research in high-quality, prospective studies.

Commentary: The authors point out there were few prospective studies investigating risks factors and none were of high quality. Many of the cross-sectional studies were of low quality, and nearly half failed to control for covariates, which limits the strength of evidence for associated modifiable factors. The authors recognize that the prospective studies included mostly young, male, elite athletes in volleyball and basketball, so the potential modifiable risk factors discussed may not translate well to the general population. The authors highlight that much of the research on risk factors for patellar tendinopathy is weak and/or conflicting. However, the modifiable and associated risk factors listed in the results above do fit the clinical pattern often associated with athletes experiencing patellar tendinopathy. I think we can use these factors as a mental checklist when assessing athletes and when problem-solving with the patient on modifying their routine and prescribing exercise that is more likely to help them return to sport faster, or miss less time due to injury. As with many systematic reviews, the take away is that more high quality evidence looking specifically at modifiable risk factors is needed.