Monthly Literature Review

Citation:
Nawasreh Z, Logerstedt D, Cummer K, Axe M, Risberg M, Snyder-Mackler L. Functional performance 6 months after ACL reconstruction can predict return to participation in the same preinjury level 12 and 24 months after surgery. *Br J Sports Med*, 2017; doi:10.1136/bjsports-2016-097095: 1-7.

Review submitted by:
Jennifer M. Boyle, PT, DPT

Objective:
The purpose of this study was to:

1) Investigate if return to activity criteria can help predict return to participation in the same preinjury activity level 12 and 24 months post ACL repair.
2) Determine which individual and combination of return to activity criteria 6 months post ACL repair predicts return to participation in the same preinjury activity at 12 and 24 months post repair.

Methods:
A prospective, longitudinal cohort study performed by 107 participants between the age of 15 and 50 that were regular participants in 1 or 2 sport activities that involve jumping, cutting, pivoting and lateral movement prior to injury. Participants received reconstruction surgery of the ACL with a progressive postsurgical rehabilitation program including resolution of joint effusion, rom limitations, strength impairments and activity limitations. Baseline measurements of isometric quadriceps index, single leg hop test, KOS-ADL and GRS were taken at 6 months. At 12 and 24 months post ACLR participants were asked "yes or no" if they have returned to the same level of sport they were participating in pre injury. At 6 months post ACL repair the participants that scored ≥90% were considered PASS group and <90% were considered FAIL group.

Results:
Participants in the PASS group had an 81.1% and 84.4% return to participation in the same preinjury activity level, while only 44.2% and 46.4% of the FAIL group returned at 12 and 24 months returned to preinjury activity level.

Conclusions:
While looking at the ability to return to the same preinjury activity level, the participants that passed the 6-month criteria had a higher return to activity rates than the participants that failed the criteria at both 12 and 24 months. Additionally, the single leg hop were the consistent predictors of the outcomes at 12 and 24 months.

Commentary:
This study is helpful in showing what standardized tests and associated scores are most indicative of returning to prior level of activity post ACL reconstruction. ACL reconstructions are very common sports injuries and the ability to help predict a patient's outcome and return to activity chances based on a grouping of pre testing can be helpful in post reconstruction expectations from the care provider and patient. I would like to see this study performed before the 6-month period of time when these participants initially passed the criteria. I feel like this has value in order to help clear patients and they can gradually return to activity faster and with more confidence as opposed to waiting for the preset 6 month baseline.

Ithurburn MP, Paterno MV, Ford KR, Hewett TE, Schmitt LC. Young Athletes After Anterior Cruciate Ligament Reconstruction With Single-Leg Landing Asymmetries at the Time of Return to Sport Demonstrate Decreased Knee Function 2 Years Later. Am J Sports Med. 2017;45(11):2604-2613.

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

Objective: The purpose of this study was to examine the effect of single-leg drop landing movement symmetry at the time return to sport on knee function at 2 year follow up in young athletes s/p ACLR.

Methods: 48 young athletes who had undergone ACLR were assessed at the time of return to sport and at 2 years following return to sport. Three sagittal plane landing variables were assessed at the time of RTS with 3-d motion capture software: knee flexion excursion, peak internal knee extension moment, and peak trunk flexion. The limb symmetry index was used to split the group into symmetrical and asymmetrical groups for each variable. At 2 years following RTS, knee function was measured using the Knee Injury and Osteoarthritis Outcomes form (KOOS) and single-leg hop tests.

Results: The asymmetrical knee flexion excursion group demonstrated decreased knee function at 2 year follow-up compared to the symmetrical group on the KOOS-Pain (ASYM: 93.0 6 8.2; SYM: 98.4 6 3.0; P = .008) and KOOS-Quality of Life (ASYM: 81.6 6 16.1; SYM: 94.1 6 9.7; P = .008). Knee flexion excursion was associated with knee functional recovery on the KOOS-Pain and the KOOS–Quality of Life (P = .033 and P = .012, respectively) at 2 years after RTS, after controlling for quad strength, limb symmetry index, and graft type.

Conclusions: Young athletes after ACLR with asymmetries in knee kinematics at the time of RTS experienced decreased self-reported knee function at a 2 year follow-up assessment.

Commentary: It is important to note that the differences between the symmetrical and asymmetrical knee flexion excursion groups on the KOOS-QoL measure exceeded the MDC and MCID of the measure, indicating that there was also a clinically significant difference between the groups. Recent studies have called into question whether comparing the involved limb to the uninvolved limb is an appropriate comparison in patients following ACLR. These studies have shown deficits in knee extension torque development rate and SL hop testing between the uninvolved limb of someone who underwent ACLR and healthy controls. Additionally, differences in single leg squat mechanics on the uninvolved limb have been noted between ACLR patients and healthy controls. One takeaway from this study is the importance of examining landing mechanics in athletes post ACLR and attempting to make corrections in their form to potentially improve function in the long term.

A FOUR-PHASE PHYSICAL THERAPY REGIMEN FOR RETURNING ATHLETES TO SPORT FOLLOWING HIP ARTHROSCOPY FOR FEMOROACETABULAR IMPINGEMENT WITH ROUTINE CAPSULAR CLOSURE. Kuhns, B. D. et al. Int J Sports Phys Ther. 2017 Aug 12(4): 683-696.

Review submitted by Katie Long, PT, DPT

Objective: Clinical commentary describing a four-phase physical therapy regimen following hip arthroscopy with routine capsular closure for the treatment of FAI in order to promote return to sport in athletes.

Surgical Inclusion: The patients undergoing this arthroscopic surgical treatment were young, active patients with a diagnosis of FAI who had undergone an in-office work up, had diagnostic imaging, and who had failed conservative management consisting of non-steroidal anti-inflammatory medications, physical therapy, and corticosteroid injections. Following surgical procedure, patients are given a brace to limit hip abduction and rotation and post-operative rehabilitation begins immediately.

Rehab Protocol:

- **Phase One**: Protect the Joint. Post-Op: 1-6 weeks.
    - Goals: symmetrical ROM by 6-8 weeks.
    - Restrictions: Hip flexion to 90 deg (x2 weeks), hip abduction to 30 deg (x2 weeks), hip extension to 0 deg (x3 weeks), hip ER at 90 deg of flexion to 30 deg (x3 weeks), hip IR at 90 deg to 20 deg (x3 weeks), no sitting >30 minutes, no AROM (x4 weeks).
    - Interventions: Soft tissue emphasis on TFL, iliopsoas, QL (weeks 1-6); isometrics of quadriceps, adductors, guteals, TA) (weeks 1-2); clams/reverse clams (weeks 1-3) TA activation with bent knee fall outs (weeks 1-3); prone hip IR/ER, hamstring curls.
    - Progression to Phase Two: display minimal pain, ambulate without gait deviations, ROM equal or near to contralateral limb.
- **Phase Two**: Return of Full Weight Bearing.
    - Post-Op: 3-10 weeks.
    - Goals: wean off crutches without compensatory gait patterns.
    - Interventions: initiate aquatic therapy if available (week 3); continue manual therapy; standing weight shifts (weeks 3-4); backward and lateral walking (week 3-4); mini-squats (week 3-4); prone hip extension (week 3-5); tall kneeling (week 3-6); elliptical with no resistance (week 6); joint mobilizations (week 6-10); double leg squat (week 6-10); step up progression (week 6-10); plank progression (week 6-10).
    - Progression to Phase Three: able to achieve good proximal and distal stability without compensatory strategies due to fatigue, demonstrate minimal pain throughout session.
- **Phase Three**: Return to Pre-Injury Function.
    - Post-Op: 8-16 weeks. Goals: Return to pre-injury level.
    - Goals: Return to pre-injury level
    - Restrictions: no agility drills (until week 16), no CKC rotational activities (until week 10), no treadmill walking (until week 12—AlterG treadmill allows for earlier return to run training)

    - Interventions: manual therapy prn; lateral walking and retro walking with resistance, SL balance-squat, trunk rotation, SL bridges, planks and side-planks (weeks 8-16); weight bearing hip rotation activities (weeks 10-16).
    - Progression to Phase Four: when able to perform all phase three exercises without pain and demonstrate good proximal and distal stability during running and functional activities.
- **Phase Four**: Return to Running and Sport
    - Post-Op: 16-32 weeks
    - Goals: Return to sport
    - Restrictions: dependent on functional strength and proximal control assessment
    - Interventions: return to run program at 16 weeks (AlterG) or 20 weeks (no AlterG); agility drills (weeks 20-32); cutting activities, plyometrics, return to sports-specific activities (weeks 24-32)

Conclusions: The purpose of this article was to provide a framework for progression of young, active patients through a return-to-sport program following arthroscopic correction of FAI with routine capsular closure. The authors indicate that the need for the capsular closure is especially prominent in this patient population, as there is evidence of increased hip dislocation and subluxation following arthroscopic FAI surgery without capsular closure and that failure to close the capsule is one of causes requiring revision following initial procedure. The authors also note that there is evidence to support improved return to sport and improved hip outcomes in those following hip arthroscopy for FAI with complete capsular repair. Mobilization following open capsule procedures is contraindicated, however in this protocol including those with a closed capsule procedure, joint mobilization is recommended to prevent complications postoperatively.

Commentary: This article is particularly relevant as the incidence of surgical correction of FAI continues to become more prevalent. As most of the patients undergoing these surgeries are young athletes, the need for an established protocol for return to activity has become an increased need in the physical therapy field. While this protocol must be adapted in its final stage for specific sport demands, it provides a good framework for structure of the plan of care and estimated time frames. This protocol also describes use of a hip brace and CPM machine, for which there are conflicting opinions and literature, discussion with the surgeon regarding those components might be warranted as opinions regarding their prescription differ.

Acute changes of hip joint range of motion using selected clinical stretching procedures: A randomized crossover study. Hammer AM, et al. Musculoskeletal Science and Practice. 32(2017) 70-77

Review submitted by: Justin Pretlow, DPT, OCS

Objective: To compare 3 clinical stretching procedures and their effects on hip abduction ROM and peak isometric maximal voluntary contraction (MVC)

Methods: A randomized crossover design of 40 individuals, age 18-35, with limited hip adductor flexibility verified by a Cybex Add/Abd Machine. A modified lunge, a multidirectional stretch, and a joint mobilization were compared against a passive static stretch and a control. Each intervention was performed for 60 secs. Pre and post intervention measurements of hip abduction ROM were recorded on the Cybex. Peak MVC of adductors was recorded utilizing the Cybex and handheld dynamometer.

Results: In terms of ROM gains – A statistically significant difference was found between the Multidirectional Stretch group and the control. No significant difference found between the other 3 interventions and control. In terms of change in MVC of adductors – None of the stretching procedures induced a significant decrease in force output.

Conclusions: The three clinical stretches were found to be as effective as static stretching but not better. Acute gains in ROM with a single stretching session are minimal (1-1.7 deg range for the interventions in this study). Although hip abduction is a frontal plane motion, multi-planar stretches may be helpful to increase extensibility of the tissues limiting abduction ROM. Multiple methods of stretching the hip adductors for 60 seconds seems to have no detrimental effect on isometric strength.

Commentary: A weakness of this study, and other flexibility studies, is the necessary reliance on the participants' perception of stretch intensity. The authors attempted to help standardize participant reporting through the use of a stretch sensation scale (SSS). The SSS is a numeric rating system 0-10 with smiley face pics and descriptors, much like a visual pain scale. The interventions were adjusted to provide an optimal stretch, which was a 7 out of 10 on the SSS as reported by subjects. Each of the 3 clinical stretches utilized involved some type of oscillatory movement. In that regard, the MVC findings of the study support other research indicating that dynamic stretching and non-prolonged static stretching can be performed without negatively impacting strength.

Observational Scapular Dyskinesis: Known-Groups Validity in Patients With and Without Shoulder Pain.
Plummer HA, Sum JC, Pozzi F, Varghese R, Michener LA. J Orthop Sports Phys Ther. 2017 Aug;47(8):530-537. Epub 2017 Jul 6.

Review Submitted by Sarah Bosserman

Objective: Aim One was to characterize the prevalence of scapular dyskinesis in participants with shoulder pain when compared to a matched control group without shoulder pain. Aim Two was to examine the prevalence of scapular dyskinesis as rated by examiners blinded and unblinded to the presence of shoulder pain to assess potential bias that may exist when using the scapular dyskinesis test (SDT).

Methods: 135 participants were divided into control (n=68) or shoulder pain (n=67) groups. Arm dominance was controlled for between groups and inclusion criteria included being aged between 18-70 years and at least 2/10 shoulder pain rating. Both shoulders were tested during weighted flexion and abduction on the SDT. The examiner observed for the presence of scapular dyskinesis (winging and dysrhythmia) and rated scapular movement as normal, subtle, or obvious. For those with shoulder pain, the SDT was performed for both shoulders and by both the blinded and unblinded examiners. The control group was assessed by the blinded examiner only.

Results: Aim 1: There was no significant difference between groups for the prevalence of scapular dyskinesis during flexion (P=0.51) or abduction (P=0.09) as rated by the blinded examiner. Aim 2: There was significant differences in the rating of scapular dyskinesis between the blinded and unblinded examiners for the involved shoulder during the flexion SDT (P<0.001), with similar results for abduction (P=0.001). There was also a significant difference between examiners for the abduction SDT of the uninvolved shoulder (P=0.008), but not for the flexion SDT.

Conclusions: There were no statistically significant differences in the prevalence of scapular dyskinesis in those with shoulder pain as compared to those without, thus scapular dyskinesis is an impairment that may represent normal movement variability. There is a risk of potential bias with examination of dyskinesis in patients with known shoulder pain as higher rates of prevalence were reported by unblinded vs blinded examiners.

Commentary: There have been earlier studies that have investigated scapular asymmetries within individuals (Uhl et al 2009), while this study was able to show no difference between groups without relying on asymmetries to determine presence of scapular dyskinesis. While this study showed that dyskinesis may not be a relevant impairment for those with shoulder pain, it did detail how further research on tests such as the scapular reposition and/or assistance tests may help to further differentiate the role of the scapula in shoulder pain. A weakness of this study may be that all the participants with shoulder pain had low levels of pain and disability and they did not control for diagnosis (7 different diagnoses included) and thus it is impossible to determine the impact dyskinesis may have on a specific diagnosis or on those with higher disability. Clinically, it is important to consider the potential for confirmation bias with observational assessment. A comprehensive assessment of all impairments, including scapular tests that alter patient symptoms, can help guide clinical decision making and treatments.