

clinical conduit

by Ed Mulligan, PT, DPT, OCS, SCS, ATC

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Evaluation and Management of Posterior Cruciate Ligament Injuries



There is an excellent masterclass article in the most recent issue of *Physical Therapy in Sport* by a good friend of mine named Mike Rosenthal who is a high-ranking PT in the U.S. Navy. I had the privilege to review this paper and provide editorial input and I believe this is one of the best summaries on the management of posterior

cruciate ligament (PCL) injuries that has been published to date. I'd like to highlight some particularly valuable insights offered by the article but would encourage you to get a copy of this article for your personal library.

PCL injuries only represent 2-3% of ligamentous injuries of the knee but are more common in direct traumas that result in large effusions. The PCL is roughly double the diameter of the anterior cruciate ligament and consists of two bundles with the anterolateral bundle tighter in extension while the posteromedial bundle is taut in flexion. The ligament is the primary restraint to posterior tibial translation but there is inconclusive evidence regarding its role to varus and valgus stress. Increased tibial external rotation may be present with a PCL injury and is magnified if the posterolateral corner (arcuate complex) is also damaged.

Many PCL injuries result in long-term patellofemoral pain which can be explained by the increased pressure in the medial tibiofemoral and patellofemoral compartments secondary to a persistent posterior subluxation of the medial tibia.

The mechanism of injury is typically a posterior force on a flexed knee with concurrent articular cartilage lesions on the medial femoral condyle and/or patella. Articular damage is particularly prevalent if there is concurrent injury to the other stabilizing structures of the knee. Unlike the ACL, an audible "pop" is usually not heard at the time of the injury and the patient has a more vague, non-specific symptomatic complaint. Terminal knee flexion is often limited because the tibia has assumed an earlier posterior position as the knee begins to bend.

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Exercise Perspective during Early Rotator Cuff Post-Op Rehabilitation

Over the past 30 years I've seen a constant swing of the pendulum in regards to the aggressiveness of motion reacquisition following a rotator cuff repair. Back when the anterior deltoid had to be taken down with an open repair we had to wait six weeks while the deltoid reattachment healed with the patient immobilized in a sling for six weeks. With the advent of "mini-open" or arthroscopic approaches, along with improved methods of fixation during the past couple of decades, we (or at least I) became much more proactive in regaining passive range as quickly as possible. This was particularly true with smaller tears in younger patients with no significant co-morbidities. Despite decent evidence that those who would get stiff manifested this phenomenon early in the rehab process we have seen the pendulum swing back towards a longer period of post-op immobilization in the name of protecting the cuff from deleterious tensile forces that would interrupt the healing process of the repaired tendons (see page 3 article). So, the dilemma I'm wrestling with is - what are the rehabilitation activities that can be safely performed to engage the scapulothoracic force couple, "wake up" the rotator cuff, and prevent glenohumeral stiffness without interfering with the healing process? The current protocol in our department is to take a look at the patient's passive shoulder mobility at 2 weeks post surgery and if ...

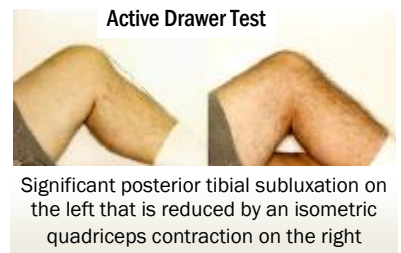
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Posterior Cruciate Ligament continued ...

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Rosenthal MD, et al. Evaluation and management of posterior cruciate ligament injuries. *Phys Ther Sport.* (2012). doi:10.1016/j.ptsp.2012.03.016

Special tests for a PCL injury include the posterior drawer, posterior sag, and active quadriceps test. The posterior drawer is graded by the degree of posterior tibial subluxation (Grade I = 3-5 mm translation; Grade II = 6-10 mm translation with the tibial plateau flush to the femoral condyle; and Grade III where the tibia plateau is now posterior to the femoral condyles). The Grade II and III injuries are often evident with the knee comfortably flexed and a “sag” or concavity of the tibial profile is visually evident. The posterior drawer and sag sign have sensitivities of 90 and 79% respectively. The specificity approaches 100% for either evaluation method. To confirm the diagnosis (secondary to its high specificity) actively contracting the quadriceps will visibly reduce the posterior subluxation. Injuries to the posterolateral corner can be ruled in or out with the Dial, external rotation recurvatum, reverse pivot shift, and varus stress tests.



Non-operative management is the initial recommendation for all grades of isolated PCL injuries. Restoration of quadriceps strength and control will often provide an adequate dynamic substitution for the damaged non-contractile structures. Surgical interventions would be considered for multi-ligamentous involvement or failure to return to function with an isolated lesion. There are a variety of single and double bundle auto or allograft procedures using either a tibial inlay or tunnel surgical technique.

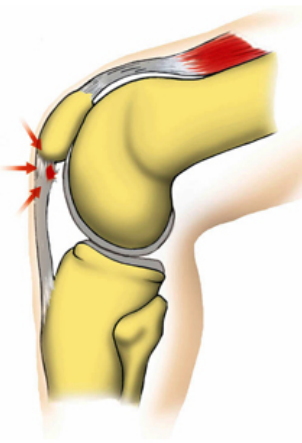
The therapeutic non-operative management strategy relies on weight-bearing exercises to improve balance, proprioception, and coordination. Quadriceps exercises are initiated in the 70-0° range to counteract the posterior subluxation tendencies while resistive hamstring work is initially avoided. For a post-operative practice guideline I'll refer you to Table 1 in the article for and evidence-based rehabilitation progression.



Question of the Month: Infrapatellar Tendinopathy

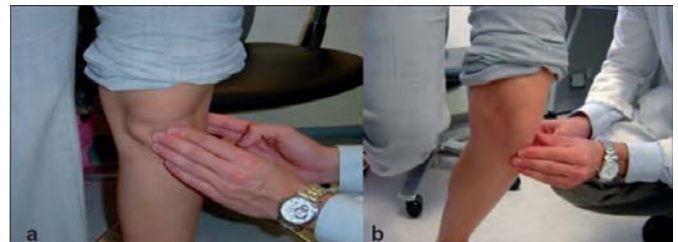
How accurate is palpation in diagnosing patellar tendinitis?

R.D., PT

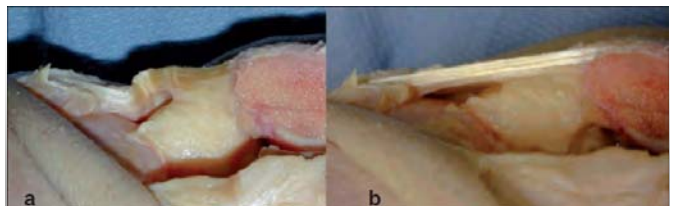


Mild palpatory tenderness of the infrapatellar tendon in asymptomatic jumping athletes is expected and considered normal. However, this can progress to a symptomatic tendinopathy if left unattended. So while the absence of tenderness can certainly rule out the condition it is relatively non-specific in confirming the pathology. One way to improve your ability to rule in the injury is to contrast palpation discomfort in a knee flexed vs. knee extended position.

Rath E, et al, published an article to show that a pathognomonic sign of the injury is a higher level of pain with digital pressure at the inferior pole of the patella in an extended position as compared the flexed position. The rationale of this phenomenon is the impingement between the deep fibers of the proximal patellar tendon on the inferior pole of the patella. These fibers are easily deformed with anter-



Palpatory pain with knee in full extension is usually reduced if repeated in a moderate amount of tension with minimal quadriceps tension



Cadaveric evidence for how the deep proximal posterior fibers of the patellar tendon are protected by the knee in a more flexed position

ior to posterior palpation pressure. In 90° of flexion or with mild active tension as in a mini-squat, the more superficial anterior fibers are stretched and protect the deeper posterior fibers from pressure deformation

Questions you would like addressed in a future issue can be sent to mulliganpt@tx.rr.com

Rotator Cuff Exercise continued -

they are not able to get 90° of passive shoulder elevation and do not have at least neutral external rotation we start them in physical therapy right away using some of the exercise activities in the chart below as they have been shown to yield inconsequential rotator cuff tension. In other words, these exercises are perfectly safe to initiate multiple times per day even though the patient remains immobilized in their sling for the majority of the day.

The chart below is based on a collection of works that have been published investigating the EMG activity of common rehabilitation activities. Note that the single asterisk indicates there is less than 10% of a maximal voluntary isometric contraction (MVIC) in electrical activity during that type of exercise. Double asterisks indicate that EMG activity is in the 10-20% range of an MVIC. For those with elevation deficits you can see that forward bows, table slides, anti-gravity side lying elevation, and self-assisted flexion passive range of motion are all activities that could be done with minimal concern regarding undue tension on the healing cuff.

Exercise Activity	Deltoid	Supra-spinatus	Upper Trap	Serratus	Low Trap
Pendulum: Small Arc (<20 cm arc)	*	*	*	*	*
Supine Flexion PROM	*	*	*	*	*
Forward - Side Bow	*	*	*	*	*
Side Lying Elevation	*	*	*	**	*
FF Table or Ball Slides	**	*	*	*	*
Supine Press Up - 1 lb.	**	*	*	**	*

* < 10% MVIC; ** 10-20% MVIC

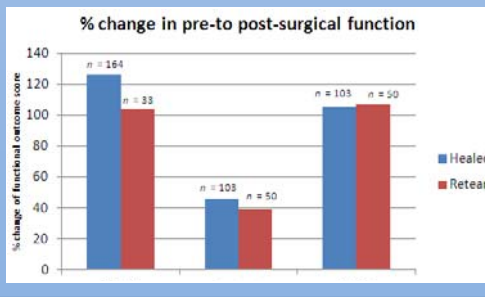
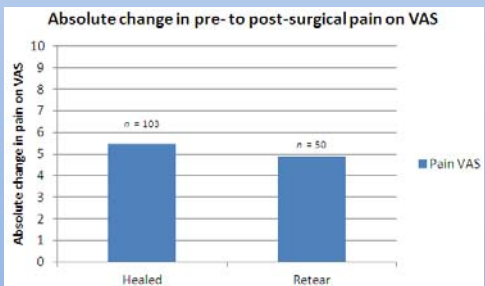


Healing after Rotator Cuff Repair: Does it really make much difference?

A couple of recent studies have suggested that we need to be more conservative in our initial acquisition of mobility following rotator cuff tears. These studies (Cuff DJ, *JSES*, 2012; Lee BG, et al, *Arthroscopy*, 2012; Kim YS, et al, *AJSM*, 2011; Parsons BO, et al, *JSES*; 2010) suggest that pain and ROM tend to be equal at 6-12 months regardless of whether or not the patient is immobilized the first 4-6 weeks. Thus, the more conservative approach is generally considered more desirable in the name of ensuring cuff healing.

I'm currently helping an orthopedic surgery resident in preparing his manuscript for a meta-analysis that is looking at the functional outcomes and pain levels in patients that had intact vs. torn or unhealed rotator cuff tendons at long-term follow-up. We know that re-tear rates vary from 10-40% with the larger tears having much greater odds of not healing. That said the review is evaluating if there is, in fact, any difference to patients at long term follow-up.

Common sense, and the most recent literature, has suggested that we need to be careful in the early post-operative phase to avoid undue tension on the repaired cuff tendons to enhance the chance for healing. However, as can be seen in the charts below, it doesn't seem to make much difference in terms of pain or function. According to three studies that compared groups with torn and healed pain there was a very small absolute decrease in pain levels at a one-year follow-up (see chart below). In fact, the average pain score on a numerical pain rating scale was about 2/10 in the "torn" group vs. 1/10 in the "healed" group. The same phenomena holds true when looking at function as measured by self-report outcome tools (see chart below). Stay tuned – I think further research is necessary to clarify this debate.



References

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 Kim YS, et al. Is early passive motion exercise necessary after arthroscopic rotator cuff repair? *Am J Sports Med.* 2012 Apr;40(4):815-21.
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"Featured Internet Link"

www.apta.org/PTNow/



The APTA's clinician Web portal, PTNow, is a collaborative effort designed to simplify your search for current best evidence and locate external resources that have been vetted for relevance and credibility. It is currently available in its beta format and intended to be a multi-purpose tool for translating research information to clinical practice in an efficient manner. The APTA is requesting feedback on the utility of this tool so as to meet the needs of its membership. Take a look at the site; it already has clinical practice summaries for BPPV, COPD, Parkinson's disease, and Total Knee Arthroplasty. It also has a "Recent Findings" feature that highlights new PT-related articles published (usually before appearing in print) in peer-reviewed journals of interest to all PT educators, researchers, and clinicians. One of the most recent summaries provides an overview of a couple of recent meta-analyses that questions our effectiveness in managing post-op THA and TKA patients. More importantly, it provides insights into why this may be true and what we could do to reverse this phenomenon (earlier and more intense exercise after surgery). Check it out.

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1901 Pintail Parkway
 Euless, TX 76039

Phone: 817-488-2061
 Fax: 817-684-7201
 Email: mulliganpt@tx.rr.com
www.continuing-ed.cc

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Rehabilitation Exercise Technique

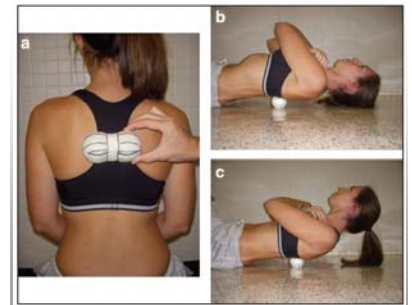
Thoracic Self-Mobilization Mini-Crunches

Many of us have used tennis balls to provide sustained pressure over trigger points in the soft tissue structures surrounding the cervicothoracic spine but there was a great clinical suggestion in a recent article in the *International Journal of Sports Physical Therapy* on how use two tennis balls (taped together) to mimic the effect of a half foam roll to self-mobilize the thoracic spine into extension. Thoracic extension mobility is an important component motion of overhead arm elevation.

To perform this self mobilization the patient needs two tennis balls. The tennis balls are secured together by encircling the balls with multiple elliptical straps of tape. A final strip of tape is applied with taut pressure perpendicular to the elliptical straps. This strap accentuates the groove between the balls and is the landmark for the spinous processes during the self-mobilization.

To perform the self-mobilization, the patient lies supine with arms folded across the chest to protract the scapula and allow contact of the balls with the transverse processes and ribs. The ball should be placed one level below the intended area to facilitate thoracic extension. The patient then slowly raises and extends the chest to provide the force for the mobilization. If this maneuver is painful or difficult in can be tried in standing where gravity is less influential. Typically the patient will perform 2-3 sets of 10-15 repetitions.

Johnson KD, et al, *Int J Sports Phys Ther.* 2012. 7(252-56).



"Think before you speak.
 Read before you think."



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Featured Home Study Program Hip Impairment - Low Back Pain Relationship

For the past 20 years there have been suggestions in the literature that links limited hip mobility with low back pain. While we don't have any "cause or effect" evidence regarding this correlation there seems to be a consistent association between the two in the literature. Several studies have reported that patients with low back pain have limitations in their hip rotation, hip flexion, and/or hip extension mobility. In fact, one study showed that up to 50% of older patients with chronic LBP could reproduce their symptoms with end range internal rotation and/or the FABER test. The theory behind this association is that patients with hip mobility restrictions will display altered compensatory lumbopelvic biomechanics and erroneous muscle control substitutions that create and/or perpetuate their low back pain. It may be possible to improve a patient's function and reduce their low back pain level simply by addressing the soft tissue or capsular limitations that may be present in the hip.

Based on the rationale of regional interdependence and the low-level evidence from case series and case-control studies I think we should at least screen the hip on all patients presenting with low back pain.

If you'd like more information on how to manage hip problems we have a TPTA approved home study that should shed light on the current concepts regarding the evaluation and management of common hip injuries. This inservice can be read and/or viewed free of charge. A post-test for CEU credit is available at <http://www.continuing-ed.cc/homestudy.htm> for a reasonable fee.



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