

clinical conduit

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Job Opportunity

Sports Physical Therapy Center Manager
In cooperation with the Orthopedic Surgery Department, the Physical Therapy Department at UT Southwestern opened a brand new multi-discipline sports medicine center in Richardson, TX last month. We are looking for a physical therapist to oversee clinical operations and assist in the development of an accredited residency program. Applicants should have experience working with athletes and certification in sports PT, athletic training, and/or strength and conditioning are preferred.

For more information please visit
www.continuing-ed.cc/sports.htm

Upcoming Courses for 2013

Advanced Manual Therapy Series
Clinical Orthopedic Rehab Education

2013 Dates - Plano, TX

- Part 1: Cervicothoracic/TMD - Apr 20-21
- Part 2: The Upper Quarter - Jun 1-2
- Part 3: Lumbopelvic Spine - Jul 13-14
- Part 4: Hip/Knee - Aug 24-25
- Part 5: The Lower Quarter - Oct 19-20 (Leg, Ankle, and Foot)

A detailed description of the course content and learning objectives is available at our web site — www.continuing-ed.cc

Single course attendance is allowed on a space-available basis

Prognostic Factors that Influence Rehabilitation Success Following Rotator Cuff Repair Surgery: Part 3 - STRENGTH



My orthopedic physical therapy residents and I recently conducted a comprehensive review of the literature on the factors that predict success following the surgical repair of the rotator cuff (RC). We organized our findings into six categories and will have our findings published in the *The Physician and Sportsmedicine* next month. The variables we discussed included tendon healing, restoration of strength and mobility, pain levels, patient satisfaction, and functional outcomes. While these factors are interdependent they each influence the final result. This 3rd chapter describes the short and long-term strength outcomes

patients should anticipate based on their unique presentation.

It is well established in the literature that larger tears may not regain symmetrical strength following surgical repair of the rotator cuff.⁴⁴⁻⁴⁹ Nevertheless, an intact cuff is associated with significantly better shoulder function, particularly in terms of strength.⁵⁰ In addition, the rate of further tendon, muscle, and joint degeneration is slowed when the cuff is intact.⁵¹ Currently strength impairments have an unclear relationship with functional outcomes. In a study comparing self-report function (SPADI and UPenn scores) to rotational and elevation torque measured by hand-held dynamometry, strength only explained approximately 20% of the variance in outcomes.⁵² Conversely, Nho et al²⁷ found that a patient with full motor strength

in forward elevation was ten times more likely to have an American Shoulder and Elbow Surgeons (ASES) score over 90 as compared to patients with weakness.

Pre-op strength deficits have also been associated with poor functional outcomes following primary surgical repairs of massive tears. Vad et al⁵³ found five negative prognostic indicators of which three were directly associated with decreased pre-op strength. External rotation and abduction manual muscle testing grades of less than 3/5, rotator cuff atrophy, and the presence of superior migration of the humeral head on radiographic evaluation were all implicated as poor prognostic outcome indicators.

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Is there a link between proprioception and laxity?

A commonly held belief in rehabilitation is that there is a direct relationship between increased laxity and decreased proprioception. The theory proposes that excessive laxity alters articular mechanoreceptor input resulting in diminished neuromuscular control. This can be a vicious cycle that results in functional instability. While this physiological principle makes intuitive sense there has been very little in the literature to substantiate this hypothesis.

A new study in the *Clinical Journal of Sports Medicine* by Laudner KG, et al, may offer some substantiation of this claim. In this study the authors evaluated the ability of 30 asymptomatic college baseball players in their ability to actively reproduce positions of shoulder rotation and compared

these abilities to the amount of anterior translation available at the glenohumeral joint. The absolute of positional error in reproducing 30° of internal rotation, 30° of external rotation, and 75° of external rotation with the arm abducted to 90° was compared (via linear regression analysis) to the amount of anterior capsular laxity as measured by an instrumented arthrometer. While there was no significant relationship between laxity and the 30° positions there was a moderate positive relationship between joint laxity and the ability to reproduce the 75° external rotation position. This relationship ...



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Shoulder Laxity and Proprioception continued ...

REFERENCES

Laudner KG, Meister K, Kajiyama S. The relationship between anterior Glenohumeral laxity and proprioception in collegiate baseball players. Clin J Sports Med. 2012;22:478-482



was significant at a level of $p = 0.001$ with a Pearson correlation coefficient of 0.56. In other words, a little over 30% of the variance between these two independent variables could be explained by the presence of the other.

I think most of us are not surprised that increased laxity does not influence joint position sense until the capsule is approaching its end range as was represented in this study (much like it would be easier to reproduce the distance between your fingers with a taut vs. lax rubber band). It seems that it would be easier for the sensorimotor system to appreciate positions in which both the contractile and non-contractile structures are receiving input from the muscle spindle, golgi tendon organs, and Type I and III articular mechanoreceptors.



While there were some flaws in the study design and limitations in generalizing the findings to a symptomatic patient population I thought this article did a good job of opening the discussion on this relationship. Patients in this population (overhead athletes) certainly need the extra mobility for performance and could benefit from improved recognition of articular relationships when their shoulder is in a vulnerable position. Enhanced neuromuscular control (through proprioceptive awareness) may reduce the cumulative microtrauma that causes pain and dysfunction.

The real question (given this moderate relationship) is what can we do to minimize this potentially damaging relationship? Previous studies have shown a direct link between limited horizontal adduction and internal rotation range of motion as a predictor of anterior shoulder laxity so a mobilization and stretching program aimed at the posterior capsule and cuff should help. To improve proprioception I recommend body blade oscillation training as well as rhythmic stabilization perturbation in the shoulder positions of risk.



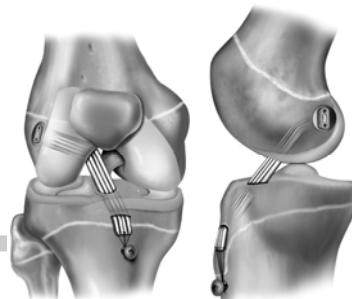
**Question of the Month:
Pediatric Anterior Cruciate Ligament Surgery**

My 12-year old daughter tore her ACL and the surgeon is recommending surgery? Is that appropriate for someone that hasn't reached musculoskeletal maturity?

- A concerned mother

This has been an area of intense research in the past decade. Not long ago the general recommendation was to brace the knee, modify activities, and wait for musculoskeletal maturity. However, new surgical technologies and insights are changing this perspective. First of all there are now "physeal sparing" means for placing the graft which minimize the risk for growth plate disturbance (see picture below).

In speaking to pediatric sports medicine orthopedic surgeons I'm told there is greater concern



regarding graft failure than growth plate arrest in this "hyperactive" population.

A recent retrospective cohort study in the *American Journal of Sports Medicine* by Lawrence JT, et al, offered another interesting consideration. These authors questioned the harm in delaying surgical reconstruction from the perspective of an increased risk for further meniscal and articular cartilage damage perspective.

While this study suffered from significant selection bias the results were nonetheless worthy of discussion and debate. In this study they found the odds ratio for tearing the medial meniscus and further compartmental chondral damage to be 4 times higher for those adolescents that waited more than 12 weeks for a surgical intervention. Not only was the risk of injury to these critical structures (for long

term knee health) at greater risk for injury with surgical delay – but the severity of damage was significantly higher. The ratio of irreparable meniscal tears and significant articular cartilage damage was much higher in those that delayed surgical intervention.

Additionally, the authors found that a "sense of knee instability" increased the likelihood for meniscal tears eleven-fold. This may be the best prognostic indicator for proceeding with surgery – if you can't "trust" you knee under pivoting loads – it may be prudent to consult an experienced pediatric sports medicine surgeon who can customize a plan of care that meets the needs of your daughter.

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



References

All references for the post-operative rotator cuff prognostic factors article are available on line at www.continuing-ed.cc/newsletter.htm

Rotator Cuff Success Prognosis: Strength Restoration continued -

The superior migration of the humeral head is an indication that the rotator cuff has lost its ability to center the humeral head on the glenoid during active elevation.



Surgical repair and fixation methods are also influential in predicting the return of isokinetic internal and external rotation strength at a one year follow-up. Bigoni et al⁵⁴ showed a 9% internal rotation and 12% external rotation deficit in peak torque generation for subjects with tendon-to-bone repairs as compared to a 17 and 21% deficit in those with side-to-side repairs with permanent sutures. In another study, tendon-to-bone fixation showed better strength in patients with larger tears as compared to side-to-side repair; however, there was no significant difference in cuff integrity at a 6 and 24 month follow-up.⁵⁵

It is not unusual for a patient to initially lose strength and power production in the early post-op phases. Hughes et al⁵⁶ showed that strength had decreased at 3 months post-op (as expected with avoidance of resistance training during this period) but had improved to a level significantly better than pre-op levels by 6 months. This expectation should be reviewed to assure the patient that time, effort, and patience is necessary to achieve maximal improvement.

Strength training programs require long-term compliance with strength recovery rates greatest between the third and sixth months. Strengthening protocols should be delayed until at least 3 months as Sonnabend et al⁵⁷ reported that maturation of the repaired rotator cuff requires 12 to 15 weeks before Sharpey fibers develop at the tendon-bone interface. Generally, patients should expect approximately 80% recovery in strength at 6 months and 90% at 12 months.⁵⁸ Slower rehabilitation progressions and lower expectations are warranted for patients with higher risks for non-healing. Additionally, patients with significant pre-op stiffness, intra-operative adhesion excision, or lysis should not be exposed to aggressive strengthening activities in the earlier phases of rehab.

Limited consideration may be given to utilizing continuous passive motion (CPM) in patients at risk for strength deficits. A systematic review by Du Plessis et al⁵⁹ could not render any definite conclusions on the benefit of regaining muscle strength with the addition of CPM to a standard rehabilitation program. However, a study by LaStayo et al⁶⁰ showed a marginally significant increase in shoulder elevation strength in subjects that had CPM in addition to their physiotherapy program. This difference was absent at 12 months and there was no difference in regards to external rotation muscle strength.

The next issue will present prognostic factors that impact post-operative pain levels.

High Ankle Sprains: Return to Play Prediction Formulas

High ankle sprains are notorious for a prolonged recovery and return to function.

The role of the syndesmosis (including the anterior and posterior tibiofibular ligaments) is to maintain the congruency of the ankle joint under physiological, axial loads.

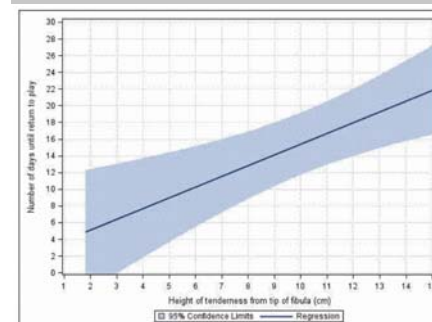


These injuries represent 5-10% of ankle sprains and are easy to recognize based on the mechanism of injury (rotational

stress as opposed to plantarflexion/inversion) and the location of point tenderness. In fact, how proximal this tenderness extends has been shown to be the best way to predict how long it will take for an athlete to return to sport.

A study by Nussbaum ED et al, in the *Amer J Sports Med* in 2001 provided a formula based on the proximal extent of interosseous membrane tenderness as a predictor of time to return to play. The formula was 5 days + the number of centimeters of proximal tenderness x 0.93 equaling the time to return to play. As an example, tenderness extending 10 cm above the tip of the malleolus would predict a 2-week absence from sport.

Based on a linear regression model, Miller B, et al, found a similar finding in a recent study. Their formula was slightly different but the results are very similar to the previous research. Their formula was 1 day + 1.29 x the palpation height tenderness. Additionally, these investigators found that player position was a confounding variable. Football players that played skilled positions (running backs, defensive backs, receivers, etc) required an additional 6 days to recover athletic ability. Both formulas have a confidence interval of 3-4 days.



"Featured Internet Link"

CSM Combined Sections Meeting
January 21-24, 2019 | San Diego, California

I don't know about you but I find one of the best continuing education events each year to be the Combined Sections Meeting sponsored by the APTA. I've only missed a couple of meetings over the last 30 years and never left disappointed. There is a wide variety of educational content that should meet the needs of any clinician and is well attended by both the academic and clinical community. I urge you to attend at least once in your professional life – maybe I'll even see you in San Diego next month. Go to www.apta.org/csm for complete programming, travel, and registration information.

Previous issues are archived at
www.continuing-ed.cc/newsletter.htm



When someone is nasty or treats you poorly, don't take it personally. It says nothing about you but a lot about them.



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2013

Clinical Orthopedic Residency Education Series: An Advanced Manual Therapy Education Track



These courses are designed to provide a comprehensive overview of orthopedic physical therapy (from head to toe) based on the APTA's definition of advanced specialty practice. We've had a number of clinicians from the community take the series in the past two years and received excellent feedback on the content and format. In fact, we've had 15 clinicians from our first two classes pass the orthopedic specialty (OCS) exam. We anticipate another 8-10 from the 2012 class to be sitting for the exam in March. If you'd like a mechanism by which to prepare for the exam or would simply benefit from advanced coursework with expert colleagues, we hope you'll consider joining us this year. These courses are taught by the orthopedic faculty at UT Southwestern. The 2013 series will begin again in April. The course content includes examination and intervention strategies for the cervicothoracic spine, upper quadrant (shoulder, elbow, hand), lumbopelvic spine, and lower quarter (hip, knee, ankle/foot). All of the material is based on current evidence with over 50% of the on-site course work devoted to lab demonstration and practice. For more information on the 2013 advanced clinical orthopedic education series please visit our web site at www.continuing-ed.cc/residencycourse.htm. Let us know if you'd like us to send you a brochure. The courses are designed as a series but attendance at singular courses is allowed on a space available basis.



Hamstring Strains

What Factors Predict Return to Play Time following Hamstring Injuries?

A recent article in *Sports Health* compared MRI findings with return to play time in professional football players who suffered a hamstring injury. Because MRIs are expensive and not typically necessary in "regular" patients where return to play concerns are not as critical I found the scoring system the investigators utilized to grade the severity of injury on MRI evaluation to have clinical relevance for physical therapists. Each MRI was scored for severity based on the patient's age, which muscle was involved, the location of the injury, the cross-sectional and longitudinal area of involvement, and the degree of retraction. As expected, severity was scored at a higher level for increasing age, more distal involvement, tendon retraction, and larger tears in size.



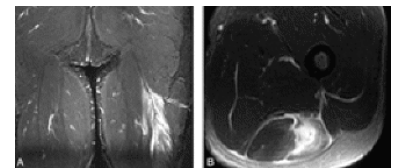
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When evaluating how quickly the athlete took to return to play it was the size of the tear (and its retraction status) that was more predictive than the age of the patient or the specific hamstring tendon that was involved in predicting the time it took to return to activity. Surprisingly, only 8 of the 38 subjects in the study had a recurrence of their injury despite what I would describe as an antiquated rehabilitation protocol utilized in the study. For a more proven philosophy of rehabilitation for these injuries I will refer you to [last month's newsletter](#).



If you're interested in other studies regarding hamstring rehabilitation or other orthopedic pathologies of the hip you may enjoy our home study on Orthopedic Hip Injuries: From Adolescence to Adulthood. 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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