

clinical conduit

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

During the past year my colleagues and I have focused on the evaluation and management of lateral hip pain. This has culminated in presentations at the Combined Sections and TPTA annual meetings. Over the next 4 issues we will reprint our findings on Greater Trochanter Pain Syndrome as to be published in *Physical Therapy in Sport* in 2015.

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Single course attendance is allowed on a space-available basis

This is the final year that I will be offering this series. Please consider join us for my final year of teaching this content.

Greater Trochanteric Pain Syndrome (GTPS): Part 5 Exercise-related Intervention Strategies



Therapeutic exercise is a key treatment for patients with GTPS. The exercise rehabilitation process begins with frontal plane exercises in the "outer" range of hip abduction by not allowing the hip to adduct past a neutral position. A good verbal command is to instruct the patient to never drop their knee below the height of their pelvis during the initial stages of exercise when in a side lying position. It is also important to emphasize contribution from the deeper gluteal muscles while avoiding over activation of the TFL. This compensation is both palpably and visibly notable with the patient substituting by preferentially flexing and internally rotating the hip to execute the abduction movement. The hip abduction progression is started in true side lying with the pelvis perpendicular to the support surface as posterior inclination is another mecha-

nism commonly used to substitute with TFL (Willcox, 2013). With the pelvis facing upwards and the hip in neutral flexion-extension the patient palpates the gluteus medius just posterior to the greater trochanter with the thumb. The therapist or patient can use their fingers to palpate in front of the trochanter to identify an excessive contribution by the TFL during the lifting movement. Exercises which have been found to maximize the EMG activity of the gluteus medius to TFL ratio include the clam shell, sidestep, unilateral bridge, and hip and knee extension from a quadruped position (Selkowitz, Beneck, &, Powers 2013). However, the clam shell can be a painful exercise in the acute phase particularly if performed against resistance. In these instances, minimization of the external rotation element of the exercise can be accomplished by simply asking the patient to perform isometric holds with a shortened lever arm (knee flexed) in a true frontal plane neutral position.

As pain and inflammation subside and consistent, voluntary frontal

plane control of the hip through the gluteus medius is demonstrated the patient can transition to a more aggressive progression of hip abduction strengthening. Exercises can progress in difficulty and can include an eccentric (musculotendinous lengthening) component which may be valuable in reorganizing collagen and improving tensile tolerance as has been shown effective with degenerative tendinopathy conditions in other parts of the body. Traditional treatment of tendinopathies has included eccentrics in order to promote tendon remodeling and changes in neurotransmitters and vascularization within the tendon (Frizziero, Trainito, Oliva, Aldini, Masiero, & Maffulli, 2014). It is essential in the later stages of rehabilitation for the patient to progress to controlled eccentric loading in multiple planes, particularly the transverse and frontal planes when considering the hip biomechanics and functional use of the gluteals. Eccentrics are introduced gradually in order to minimize further tissue disruption during tissue repair and

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Football Theme Issue: Knee Injuries

With the start of the new football season, I thought it would be fun to dedicate an issue to some medical issues and concerns related to the greatest sport on earth American Football. Whether you're a fantasy player or just want to understand the injuries that happen to your team – I hope you find some interest in this theme issue. If well received, my plan is to do a similar issue specific with basketball for our November issue.

Knee pathology is common in the NFL and certainly the most

"studied" part of the anatomy when it comes to football injuries. If you're a Cowboy fan, like I am, you were disappointed by the recent news that our starting cornerback, Orlando Scandrick, is out for the year with a torn ACL. This should not be surprising as serious injuries in the pre-season are on the rise over the past decade. See the chart on page 3 for a graphic representation of this recent trend. Most alarming is that 24% of these injuries are to the ACL.



- continued on page 3

GTPS Exercise Intervention Strategies continued



The references provided in this article are available as full citations in a bibliography available on-line at our web site - www.continuing-ed.cc

I also would like to acknowledge my colleagues and co-authors for their contributions to the manuscript. Thank you to:

Dr. Emily Middleton, PT, DPT, OCS, CSC
Dr. Meredith Brunette, PT, DPT, OCS

remodeling (Geraci & Brown, 2005). There is no current research on the treatment of gluteal tendinopathy via eccentric loading although logic would suggest that this mode of exercise could potentially result in similar positive outcomes.

It is important to alert the patient that there should be a slight elevation in pain during the exercise but assured that this is an expected part of rehabilitation during these later stages. The patient should be encouraged to tolerate exercise-induced discomfort as long as the pain does not increase by more than 10-20% during the exercise and quickly returns to baseline following the completion of the rehabilitation session. For each intensity level, the exercises generally begin with the non-weight bearing mode of exercise because of the lower contractile demand and the easier control for triplanar compensation.

If the patient's goal is to return to a running activity; the intensity, duration and frequency should be reviewed during the activity recommendation advice portion of the treatment session. Training surface, road elevation and camber may be contributing external risk factors and the runner should be monitored for excessive femoral adduction and poor pelvic control at foot strike. The presence of a structural or functional limb length discrepancy necessitating increased pronation on the downside leg can be addressed with taping, orthotics, and/or a change in training surfaces.

Although not prescribed or provided by physical therapists medical management may contribute to the success of both long and short-term outcomes. A combination of local analgesic and corticosteroids may be injected at the point of maximal palpatory tenderness or under direct ultrasonographic guidance (Klauser, 2013). Six months of symptom relief from bursal injection confirms the GTPS diagnosis; failure may suggest symptoms may be mediated by spinal or intra-articular hip disorder (Shbeeb & Matteson, 1996). In a systematic review, corticosteroid injection alone resulted in mean improvement of 2.8 points on a visual analog scale (VAS) and this was significantly better than after home training or extracorporeal shock wave therapy (ESWT) at one month from baseline. However the short term superiority declined at both the 4 month and 15 month follow up (Lustenberger et al., 2011). Long term effectiveness in reducing pain and improving function was demonstrated in a systematic review of ESWT with equal or superior outcomes to injections or exercise therapy (Furia, Rompe & Maffulli, 2009; Mani-Babu, Morrissey, Waugh, Screen & Baront, 2014). The use of platelet rich plasma, autologous blood in and around tendons at any site is not currently supported by strong clinical evidence. (Loppini & Maffulli, 2011). Surgical procedures that include Z-plasty/tendon lengthening or gluteal tendon repairs are the preferred intervention for recalcitrant cases that have failed conservative treatment (Craig, Jones, Oakley & Dunbar, 2007).



Because of limited evidentiary support, optimal treatment of GTPS remains elusive. A multimodal approach incorporating activity modifications, manual therapy, therapeutic exercise, and progressive return to activity can produce positive outcomes. Isolated efficacy of any one treatment is unestablished and a customized combination of treatment modalities is recommended. Continued research on the efficacy of both operative and non-operative interventions is warranted in order to support best practice.

Details regarding the prognosis for GTPS will be addressed in the final chapter of this series in the next issue.

Gluteus Medius Exercise Training based on EMG Intensity

Beginner Low Intensity Exercises	Intermediate Moderate Intensity Exercises	Challenging High Intensity Exercises	Advanced Very High Intensity Exercises
Non-Weight Bearing			
<ul style="list-style-type: none"> Hip rotation with hip and knee flexed in sitting Hip rotation with hip extended and knee flexed and resting on a swivel stool 	<ul style="list-style-type: none"> Hip abduction in standing Clam shells in varying angles of hip flexion 	<ul style="list-style-type: none"> Hip abduction in side lying Hip/Knee extensions in quadruped position 	<ul style="list-style-type: none"> Hip abduction in side plank position
Weight Bearing			
<ul style="list-style-type: none"> Bilateral stance weight shifts in standing Single limb stance balancing in standing Bilateral bridging and plank holds in prone and supine lying Lunge steps with backward lean 	<ul style="list-style-type: none"> Bilateral to unilateral trunk rotations in standing Single limb stance balance on labile support surfaces Bilateral bridging with bent knee fallouts against elastic resistance Retro step-ups Sideways lunge Unilateral mini-squats 	<ul style="list-style-type: none"> Single limb stance mini-squats on labile surface Wall squats Unilateral bridging Forward lunge steps progressing to forward, sideways, and lateral hops Forward and lateral step ups Pelvic hip drops Single leg dead lifts 	<ul style="list-style-type: none"> Side bridges Lateral band walks Hip Hikers (dip and lift)

These exercises can be modified with a number of variables which include but are not limited to surface stability, gravity influence, lever arm length, arc of motion, and the intensity (resistance type and level), duration and frequency of the prescribed exercise dosage.

EMG Intensity classification based on the work of Bolgla & Uhl, 2005; Boren, Conrey, & Coguic, 2011; Selkowitz, 2013; Reiman, 2012; Jacobs, 2009; DiStefano, 2009; Krause, 2009.

Knee Reference

Scillia AJ, et al. Return to play after chondroplasty of the knee in NFL athletes. *Am J Sports Med.* 2015 Mar;43(3):663-8.
 Erickson BJ, et al. Performance and return-to-sport after ACL reconstruction in NFL QBs. *Orthopedics.* 2014 Aug;37(8):e728-34
 Erickson BJ, et al. ACL reconstruction practice patterns by NFL and NCAA football team physicians. *Arthroscopy.* 2014 Jun;30(6):731-8.
 Brophy RH et al. Predictive value of prior injury on career in professional American football is affected by player position. *Am J Sports Med.* 2009 Apr;37(4):768-75.



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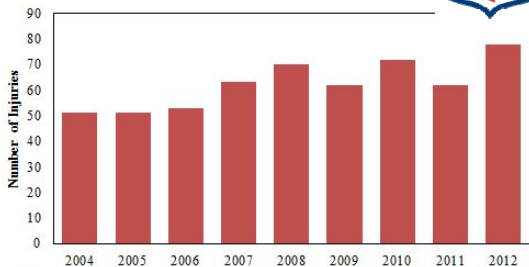
This web site is sponsored by the American Academy of Orthopedic Surgeons and reminds me of the consumer-friendly web site the APTA developed a number of years ago - www.moveforwardpt.com.

It provides the public with the latest news on bone and health joint, patient anecdotes, and the clinical opinion from the perspective of a number of prominent orthopedic surgeons.

Of particular interest is the section that details the cost-effectiveness of some surgical interventions (ACL, rotator cuff, joint replacement, hip fractures, etc). While this is useful information my bias says that the first, best, (and most economical) choice is physical therapy. Only when that fails should more invasive solutions be pursued.

NFL Knee Injuries continued -

INCIDENCE OF SERIOUS PRESEASON INJURIES BY YEAR 2004 - 2012



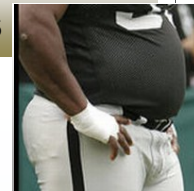
Note: Serious injuries are defined as injuries resulting in 150 or more days of recovery time.

Knee injuries account for about 40% of the serious injuries sustained in the NFL and this can certainly impact the player's career longevity. A 2014 study by Brophy RH et al, in the *Am J Sports Med* found that the likelihood of playing in the league was dependent upon position played. For instance, defensive lineman and linebackers had shorter careers if they tore their ACL (uh, oh for Sean Lee). Similarly, defensive backs that had shorter careers if they sustained a meniscal injury. Conversely, performance and return-to-sport for NFL quarterbacks is surprisingly optimistic. The last 12 NFL QBs that injured their ACL were able to return to play the following year without a significant drop in performance according to a 2014 study in *Orthopedics* authored by Erickson BJ et al. Interestingly, a 2009 study from *Am J Sports Med* by Brophy showed that history of meniscectomy is even more likely to shorten the career of an NFL player that an ACL reconstruction. One of the more intriguing studies even suggested that the odds of returning to previous level of play was associated with being a higher draft pick (Shah VM et al, *Am J Sports Med*, 2010)

Erickson BJ et al, also published an interesting study on the perspective of NFL and NCAA team physicians on how they manage ACL injuries. 86% of these surgeons default to a bone-patellar-bone graft through a femoral tunnel accessed through an antero-medial portal. About half of the surgeons recommend delaying return to sports for at least six months if hop testing is symmetrical. Contrary to current best-evidence almost all of these surgeons recommend a brace (if a running back). A 2012 analysis of lower extremity injury rate also implicated playing surface as a potential risk factor. In this study the authors found a 67% higher incidence of injury to the ACL when playing on field turf as opposed to grass surfaces.

We also now have enough history on articular cartilage procedures to study the return to play rate for NFL players with these surgical interventions. Over the past decade 67% of these players returned to play at an average of 8 months. A risk profile could not be established based on age, lesion location, size, or grade, position played, or initial draft position.

Cardiovascular Profile in Retired NFL Players



Having huge lineman can be a great advantage for your favorite football team. However, is there health

risks from being this size when their career is finished? Several studies have looked at the cardiovascular health of retired NFL players to see if adverse risk factors are of increased prevalence than in the "regular" population. The most renowned study regarding this question was published in *JAMA* about 6-7 years ago. This cross-sectional study looked at over 500 retired players from 12 NFL teams. As expected, the football players were bigger "people" with an average BMI of 31 (compared to 26 in the control group). They also had a statistically significant higher blood pressure (127/75 vs. 112/72). All other risk factors were all about the same. While the waist size was much bigger in the football group there was no difference in the waist:hip ratio (0.88 vs. 0.85). The lipid panels were also quite similar between groups with HDL at 48 vs. 49, LDL at 112 vs. 113, total cholesterol at 179 vs. 181, and triglycerides both at 96.

As a point of reference I've provided metabolic syndrome risk factors in the chart below.

Parameter	Value
Blood Pressure	≥ 130/85
Waist Circumference	> 40"
Fasting Blood Glucose	> 100 mg/dL
Total Cholesterol	< 200 mg/dL
Triglycerides	< 150 mg/dL
HDL	♂ > 45; ♀ > 55 mg/dL
LDL	< 130 mg/dL
Cholesterol/HDL ratio	< 5.0

A misleading perspective of this study is that it represents all NFL retirees (not just linemen). If you look specifically at offensive linemen, you seek a significant jump in cardiovascular risk factors. Roughly, 1/3 of these subjects had lipid panel, BMI, and hypertension risk factors. In another study from 2008 study in the American Journal of Cardiology the authors found that risk for metabolic syndrome was double that of other position players (60 vs. 30%). A 2009 study from UT Southwestern in the *Am J Cardiol* found a lower prevalence of diabetes, hyper-tension, and metabolic syndrome but a higher fasting glucose and hyperlipidemia levels. Suffice to say, while "heft" may be an advantage during the football career - those physical parameters need to change upon retirement.



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CORE Education Series for 2016

"I am blessed - the only thing I dislike about my job is that I do need the paycheck that comes with it."



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Next year will be our company's last year to provide the CORE education series. We've had a blast over the years learning with our colleagues but it has come time to turn our weekend attention to other priorities. Our granddaughter (and her future siblings and cousins) will all be back in the Dallas area in 2017 and we don't want to miss a minute of their childhood. It has been said to not retire until you have something to retire to ... and we do. I will still be available to teach occasional private courses but will leave the bulk of post-professional education duties to many of my competent colleagues. I will still continue with my academic appointment at the University (for as long as they'll have me) - I just want to free up most of my weekends to devote to other interests. So, I hope you'll consider joining us in 2016 for the final CORE (clinical orthopedic residency education) series. If you'd like a comprehensive overview of orthopedic physical therapy (literally from head to toe) based on the APTA's definition of advanced specialty practice - this is the course for you. We've had over 40 individuals use this series as the backbone of their preparation for the orthopedic specialist exam. The exact weekend dates for next year should be available in the next month or so. Drop us an email if you want to be notified when the schedule is available. I'll still be around - just spending more time on the job that I enjoy the most - being a grandpa. More information about the CORE education series is available at <http://www.continuing-ed.cc/residencycourse.htm>.



NFL Foot-Ankle Injuries



Two unique foot/ankle injuries that are common in football are to the tarsometatarsal joint (Lisfranc injury) and high ankle sprains involving the tibiofibular syndesmosis. A recent review article in Orthopedics by Osbahr DC et al, found that 40% of NFL ankle sprains were to the tibiofibular as opposed to the talocrural joint (36/89). No particular position was more vulnerable to the high ankle sprain but high ankle sprains are much more likely to involve direct contact. As indicated by the chart below we know that syndesmosis sprains take 2-3 times as long to return to play given the same level of severity to lateral inversion sprains. In the NFL, the mean amount of time lost for all levels of lateral ankle sprains was 6 days compared to 15 days for high ankle sprains. This delayed recovery is rooted in the greater need for some level of immobilization and limited weight-bearing during the acute and subacute stages of injury.

References:

Osahr DC, Drakos MC, O'Loughlin PF, Lyman S, Barnes RP, Kennedy JG, Warren RF. Syndesmosis and lateral ankle sprains in the National Football League. *Orthopedics*. 2013 Nov;36(11):e1378-84.

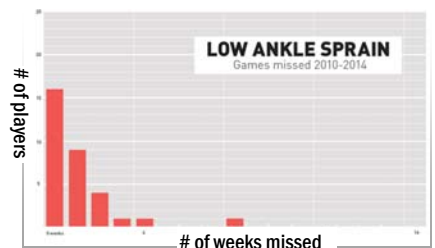
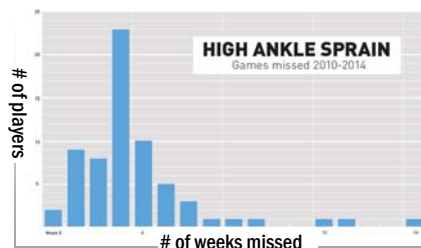
Osahr DC, O'Loughlin PF, Drakos MC, Barnes RP, Kennedy JG, Warren RF. Midfoot sprains in the National Football League. *Am J Orthop* 2014 Dec;43(12):557-61.

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Lisfranc Ligament Injury

Midfoot injuries in NFL are much less common than lateral and high ankle sprains but have the capacity to be quite disabling. The mechanism of injury is typically an axial load through the foot with the MTP joints in an extended position. Grade I injuries typically miss 3 days, Grade II miss 26 days, and Grade III miss 73 days. Grade III injuries with diastatic separation usually require surgical ORIF. The limited information from the NFL show that the likelihood of complete recovery without persistent disability is high. If you find this information valuable, you may enjoy our home study of examination of the foot and ankle. If you'd like more information on our home studies they can be found at <http://www.continuing-ed.cc/homestudy.htm>. These are all TPTA approved and can be accessed free of charge. A post-test for CEU credit for a reasonable fee is also available.

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