

# clinical conduit

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## We need a better way to screen for subscapularis integrity



I admit to being a “posterior-biased” shoulder therapist.

A lot of my evaluative and management attention is focused on posterior structures (posterior capsular mobility, posterior cuff strength, axioscapular stabilization, etc) and I pay minimal attention to the subscapularis when we know it is approximately ½ the cuff in total cross-sectional volume, often in a hypertonic state (adhesive capsulitis), and involved in rotator cuff tears 10-30% of the time. Despite its obvious importance we don’t have a good test to accurately detect its health or status. In particular, our cadre of tests is infamous for their poor sensitivity. As a result, subscap-

ularis tears, either in isolation or in conjunction with other tendinous or labral injuries, are often overlooked; resulting in sub-optimal treatment outcomes, especially when one considers that the subscapularis the largest rotator cuff muscle.

The following is a detailed description of the more common tests we use in clinical practice with a description of the method to conduct the special test. Generally, the diagnostic accuracy for all these tests is the same. All have relatively poor sensitivity but excellent specificity for detecting full thickness tears with decreasing accuracy for partial thickness involvement.

The lift-off test, described by Gerber and Krushell in the *British J Bone J Surg* in 1991 is performed by placing the hand of the affected arm on the back (at the position of the midlumbar spine) and asking

the patient to internally rotate the arm to lift the hand posteriorly off of the back.



The test is considered positive if the patient is unable to lift the arm posteriorly off of the back or if they perform the lifting maneuver by extending the elbow or the shoulder. This maneuver places the internal rotators (except the subscapularis) in a position of extreme active insufficiency. This test is particularly challenging to the lower fibers of the subscapularis. However, it is somewhat notorious for missing partial tears that are common in the upper fibers. The biggest limitation is the ability of the patient to assume this position secondary to pain or limited mobility.

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## Post-Op Rehabilitation of Meniscal Repairs

We can all agree that the post-operative management of a meniscal repair is different than a meniscal excision. With a simple excision we can start the patient on immediate weight bearing and allow their progress to be largely dependent upon their pain level, control of swelling, and restoration of quadriceps control. Conversely, the traditional philosophy following a meniscal repair is to limit or alter weight-bearing forces and restrict range of motion for 4-6 weeks following the surgery. These more conservative perspectives are utilized to enhance the likelihood for meniscal healing. While there are no universally accepted or validated rehabilitation programs there have been suggestions in the literature that a more aggressive (accelerated) protocol is not necessarily detrimental. The three most common areas of controversy are immobilization or motion restrictions, weight bearing progressions, and the time until return to activity is allowed. I’ll briefly review what the literature suggests regarding each of these issues.



**Immobilization.** The traditional opinion in regard to immediate post-op motion restriction is to limit ROM from 20-90° for the first 4-6 weeks. These precautions are thought to protect against the stress of meniscal displacement/distortion which is inherent to active motion. We know that the popliteus (laterally) and semimebranosus (medially) can place a strain on healing meniscus. For the patient with a posterior horn repair many recommend even further restriction of flexion to only 70° for the first 4 weeks. Additionally, tibial rotation (particularly in the terminal 20° of extension) may create excessive meniscal excursion that

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## Subscapularis Testing continued ...

### REFERENCES

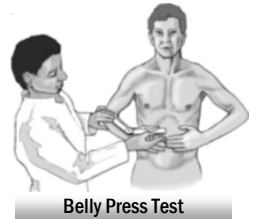
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The internal rotation lag sign is similar to the lift off-test except the examiner positions the arm in maximal internal rotation behind the back and then asks the patient to actively maintain this position as the examiner releases the wrist, while maintaining support at the elbow. The sign is positive when a lag into external rotation occurs. The test has similar limitations as the lift-off test.



Internal Rotation Lag Sign

The Belly Press test was also first described by Gerber, et al, in 1996, and is performed with the arm at the side and the elbow flexed to 90 degrees while having the patient press the palm into their abdomen by internally rotating the shoulder. The test is considered positive (1) if the patient shows a weakness in comparison with the opposite shoulder, or (2) if the patient pushes the hand against the abdomen by means of elbow extension or shoulder extension, indicating an inability to exert a force against the abdomen by active internal rotation produced by the subscapularis. The advantage of this test is that it requires less extension and internal rotation than the lift-off or IR lag sign tests.



Belly Press Test

The Bear-Hug test, described in 2006 by Barth, et al, uses resisted internal rotation (force is perpendicular to the forearm in the direction of external rotation) with the palm held on the opposite shoulder with the fingers extended (do not let fingers grab the shoulder) and the arm in 90° of elevation. A positive test is the inability to resist the force or significant asymmetry (> 20%) as compared to the uninvolved side. The limitation for this technique is the test position of elevation and horizontal adduction. It's possible this position may be a confounding variable if other pathologies such subacromial impingement and/or superior labral lesions are present.



Bear-Hug Test

Do you recommend barefoot running?



## Question of the Month Barefoot Running – Minimalist Shoes



Many of you may have been asked this question the last 3-4 years since the release of Christopher McDougall's book "Born to Run" about the traditional history of barefoot running in the Mexican Tarahumara Indian tribe. While "barefoot" can literally mean without shoes (unshod) it usually implies a shoe with minimalist "characteristics". These characteristics typically include minimal weight (< 8 oz.), high flexibility, an expanded toe box, limited (to no) heel elevation, and reduced "padding" or "cushioning" in the midsole. An outsole remains protective to the plantar surfaces of the foot.

Why did this trend start? I suspect it was because all the revolutionary "technologies" that have gone into shoe design during the past 40 years did nothing to alter the incidence and prevalence of

running-related injuries. Despite these advances it is estimated that 50% of runners suffer an injury at least once/year with 25% of runners currently injured. The vast majority of these injuries occur to the knee, leg, and foot.

One theory suggests that shod running does not challenge intrinsic foot musculature and allows these muscles to be dormant and undergo atrophy. Another theory proposes that "cushioned" midsoles allow (or even promote) rearfoot heel strike with an overreliance on the shoe design to dissipate high impact forces through ground force attenuation.

Most likely (IMO) – barefoot gait encourages a potentially altered running style characterized by a "softer" forefoot contact and quicker, shorter strides. This gait alteration has the capacity

impact and produce a smoother force transition with an increased ability to more efficiently disperse impact forces.

A recent systematic review of the literature shows that we have no high level trials to really capture the value of this type of shoe wear. The one thing we do know is that an injury is likely if the wrong person decides to run "barefoot" or does so with little progression in the intensity, duration, and/or frequency of this type of training.

The short answer is that we don't know if barefoot running is "safer". It probably is for some and not for others. We need continued research to help us identify what type of patient would (and would not) benefit from this type of recommendation.

Questions you would like addressed in a future issue can be sent to [mulliganpt@tx.rr.com](mailto:mulliganpt@tx.rr.com)

**References**

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**Post-op Meniscal Repairs** continued -



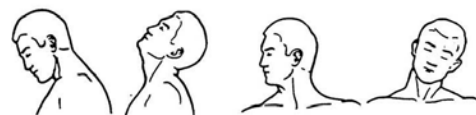
could impact healing. I think that motion restrictions should be individualized based on the complexity, size, and location of the tear in addition to the vascular zone in which the repair was conducted. For instance, AP longitudinal tears > 3 cm in the posterior sector or radial tears would benefit from a 4-8 week period of flexion limitation beyond 80-90°. In contrast, a recent study from the *Am J Sports Med* (Lin DL, et al) showed that acute posteromedial tears with vertical mattress sutures do not gap when subject to physiologic loads consistent with active range of motion when in a non-weight bearing position.

**Weight-Bearing:** During weight-bearing, compressive forces are loaded across the menisci. These tensile forces create hoop stresses which expand the menisci in extension. Research generally indicates that these stresses do not disrupt the repair approximation. Conversely, it has been estimated that flexion in weight-bearing (squatting) increases the pressure on the posterior horn by a factor of 4. Consequently, most surgeons will allow post-op partial weight bearing as long as the knee is locked in full extension (drop-lock bracing). In some cases, gravity-reduced weight-bearing environments (i.e. – chest-to-chin deep water) may allow for safe ambulation and gait-retraining activities. I would recommend you speak to your surgeon prior to implementing this strategy. The one exception to safe, early weight bearing would be complete radial or posterior root tear where there is a total disruption of the hoop stresses provided by the circumferential fibers. Obviously, rotational or plyometric activities should be strictly avoided during the first 6-8 weeks in these cases.

**Return-to-Sport:** While there is some evidence that accelerated post-op protocols do not have a deleterious effect the more conservative approach is to limit unrestricted activities for at least 4 months. There evidence in the literature from animal models that the maximal tensile strength of meniscus repairs reaches about 80% by 3 months which suggests the suture/scar construct can begin to tolerate unrestricted sagittal plane functional activities. I would recommend waiting at least another month before introducing rotational elements (pivoting, turning, etc) to the patient’s functional progressions.

Other points of emphasis that I think are more universally accepted in their application are the control of post-operative effusion, delayed hamstring strengthening (at least 6 weeks), quadriceps strength restoration emphasis, and avoidance of varus or valgus load dependent upon the affected meniscal compartment.

**Lumbar and Cervical ROM necessary for Activities of Daily Living**



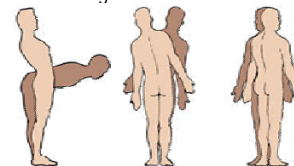
The emphasis on writing functional goals requires clinicians to have a sense of the mobility required to accomplish those tasks. I found an interesting article in *Spine* last month that assessed the amount of spinal motion we need to accomplish everyday tasks. I was a little surprised by the findings. The authors used an 8-camera optical capture system to measure the amount of cardinal plane mobility displayed by asymptomatic subjects who were performing everyday activities. They found that generally we use only about 20-40% of our cervical and 40-60% of our available lumbar mobility. The chart below details the normal range in the subjects tested and what % of that motion they used to accomplish the task assigned.

Mean ROM (°)			
Cervical		Lumbar	
Flexion	58	Flexion	52
Extension	56	Extension	20
Side Bend L	45	Side Bend L	30
Side Bend R	45	Side Bend R	29
Rotation L	73	Rotation L	30
Rotation R	69	Rotation R	36

Task	Cervical			Lumbar		
	F-E	SB	Rot	F-E	SB	Rot
Sit to Stand	22	10	7	37	13	13
Pick up from Floor	40	13	12	73	28	24
Twisting w Object	13	25	28	12	20	72
Walk	12	9	6	14	21	18
Put on Pants	23	14	11	47	26	23
Tying shoes	14	17	8	38	21	19
Shower	21	22	18	34	32	23
Put on Jacket	19	25	26	19	30	46
Clear table	28	14	11	37	19	19
Back up car	13	20	42	15	17	31
Reach to shelf	17	21	20	17	24	27
Writing	12	23	10	14	13	14
Look for traffic	14	16	48	18	21	20
Phone use	10	16	10	14	23	14
Take a drink	28	11	11	12		11
Brush teeth	14	21	17			

Activities that require more than 30% of a subject's total ROM for a cardinal plane are highlighted in yellow.

I found it interesting that we generally need a relatively small % of our normal spinal mobility in order to carry out common tasks. I was not surprised that driving a car is the greatest challenge to cervical mobility and picking up objects from the floor and dressing are the activities that challenge lumbar patients with limited motion.



Cobain DG, et al, *Spine*, 2013



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One of my previous orthopedic physical therapy residents turned me on to a new (**free!**) software package that acts essentially like EndNote in its ability to publish and manage bibliographies, citations, and references. It allows you to organize all of your research citations in a single, searchable interface. This has become the way I bookmark all of the articles I’ve read. Essentially, the articles are collected in folders much like an iTunes playlist. At any point I can tag these abstracts with my own keywords for easier organization and search. Best of all for those of you that write articles it automatically formats your references in whatever style required by the publisher. I highly recommend this software as a mechanism by which to keep track of citations that are relevant to your practice.

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content with borrowed postures,  
secondhand ideas, and fitting in  
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## Distinguished Lecture Series - Total Shoulder Arthroplasty



About four times per year the Physical Therapy Department at UT Southwestern sponsors a speaker in our distinguished lectureship series. On November 7<sup>th</sup>, from 7:00 – 8:00 PM we are pleased to have Dr. Michael Khazzam speak to us regarding the surgical indications, prosthetic options, and post-operative rehab of shoulder arthroplasty. Dr. Khazzam is an assistant professor of orthopedic surgery at UT Southwestern and provides sports medicine services for a wide range of knee and shoulder conditions. He is a prolific author and researcher with research fellowship training from the Hospital for Special Surgery and the Medical College of Wisconsin. He completed his residency training at the University of Missouri and a sports medicine fellowship at Vanderbilt. Dr. Khazzam is a member of the American Academy of Orthopedic Surgery, American Orthopedic Society for Sports Medicine, and the Arthroscopy Association of North America. The program will focus on the surgical description and indications for hemiarthroplasty, total shoulder replacement, and reverse shoulder replacement. Major elements that govern the post-operative rehabilitation will also be presented. The program is open to all rehabilitation providers and students interested in this topic. One-hour of TPTA CCU credit will be provided for attendees. Follow this [link](#) for more information and registration form. There is no fee for attendance but registration is required as seating is limited.



## Orthopedic Hip Injuries Arthroscopic Surgery

Over the past decade there has been a rapidly evolving understanding of intra-articular hip pain and how surgical arthroscopy can be used to address these impairments and functional limitations. Earlier this year there was an excellent overview of this topic in the *American Journal of Sports Medicine's* clinical update series. The paper begins with a review of the clinical history, physical examination, and imaging findings associated with labral tears, femoroacetabular impingement, capsular laxity, chondral lesions, and other intra-articular disorders. I was pleased with the emphasis on the careful examination of joint mobility to detect the presence of these problems and using advanced imaging techniques only to support the symptomatic presentation in the clinical examination.



The next section of the paper reviews many of the common conditions that cause intra-articular hip pain while covering the indications for both non-operative and arthroscopic management. Again, the authors are quick to recognize the role of the rehabilitation specialist in the initial management of the patient's complaint and under what circumstances an operative solution should be offered. Following the discussion on common injuries the authors turn their attention to describing the surgical methods to debride and/or repair capsulolabral structures. The post-operative care for these patients is detailed with an emphasis on the need and place for protected weight-bearing, motion restriction, and use of continuous passive motion following surgery. The final section of the paper provides a summary of the systematic reviews that have been published regarding the value of this relatively new surgical intervention. While most of the published literature to date is case series – this should lead to higher level trials that give us an even better sense of truly how effective this type of medical intervention benefits our patients. For those that need a comprehensive current review of non-arthritic intra-articular hip disorders this is an excellent resource and can be found in the May issue of the *American Journal of Sports Medicine* (Lynch TS, Terry MA, Bedi A, Kelly BT. Hip arthroscopic surgery: patient evaluation, current indications, and outcomes. *Am J Sports Med.* 2013 May;41(5):1174-89).

We have a TPTA approved written home study that covers this topic and many other common orthopedic injuries of the hip. This self-study is approved by the TPTA and can be accessed 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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