



# RESTORATIVE SHOULDER SERIES

**AUTHORED BY: DANNY FOLEY (MS, CSCS'D) & TIM KELLY (BS, CSCS)**

*Bonus Contributors: Nicole Foley (MS, CSCS, USAW) & Jeremy Aspa (MS, ATC, LAT)*



## **Authors Note:**

The content, philosophies, and material found throughout this manual are exclusive ideologies wholesome of the author, Danny Foley. In no capacity, is the subsequent material a reflection or extension of the authors primary place of employment (Virginia High Performance), nor is anything to be found in this manual reflective of the authors credentialing (National Strength and Conditioning Association, United States Weightlifting). Under no certain terms is the author intending to either advocate nor contradict, any of the aforementioned employers or governing bodies with any of the content found in this manual. The material found in this document is strictly a composite of personal belief and exhibitions of professional practice. Should any of the following content be subject to copyright, conduct detriment, or plagiarism, the point(s) of contention should exclusively be addressed to and held accountable to Daniel P. Foley.

**It should be clearly stated and understood by the reader that this is not a medical resource and should not be utilized to diagnose, treat, or amend any cardiovascular, metabolic, or physical health ailments.** Individuals with any known contraindicating medical history or injuries should warrant appropriate considerations prior to employing anything found in the material to follow. Should it be deemed necessary, the reader should seek a physician's exam and clearance prior to initiating any exercise suggestions provided in this manual. In the event there is any ambiguity or apprehension regarding medical conditions, please contact Danny Foley directly prior to applying anything found in this manual. The author of this manual, Danny Foley, does not assume risk or responsibility should anyone sustain injury or ailment undertaken by any of the content included in this manual. By employing any of the content described in this manual, including the content provided in the training program, **the consumer is assuming all risk for damages sustained by potential injury or harm.**

The author of this manual has published this product with the singular intention of disseminating points of interest, knowledge, and insight developed through his professional acumen on the subject of strength training. The author possesses multiple degrees, along with numerous certifications that afford him the requisite qualifications to publish this manual. He is in no way, shape, or form qualified to diagnose, treat, or amend any specific physical or physiological ailments. The materials found in this manual are exclusive to exercise and training purposes and should hereby be applied as such. **This product is not intended to be sold, redistributed, or exchanged in any capacity without the direct consent of the author, Danny Foley.**

-Danny Foley

## Background and Bio



**Danny Foley (MS, CSCS\*D, TSAC-F\*D)**  
Head Strength & Conditioning Coach  
Virginia High Performance  
Twitter/IG: [@danmode\\_vhp](#)  
Email: [info@ruderockstrength.com](mailto:info@ruderockstrength.com)  
YouTube: [Rude Rock Strength](#)

Danny is a graduate of Old Dominion University where he earned both his bachelor's and master's degree in Exercise Science ('17). Originally from Northern Virginia, Danny relocated to the Hampton Roads area for college and has considered it home ever since. He is the proud husband of Nicole Foley and (puppy) dad of Rudy and Rocky.

Danny is currently the head strength & conditioning coach at Virginia High Performance and has been on the VHP staff for 4 years. Throughout this time, he has worked predominantly with a tactical (military) population, most of which have been athletes from the special forces/spec ops communities. A major component to Danny's work involves injury rehabilitation, most frequently seeing athletes with shoulder and spinal injuries. Although it wasn't the initial goal or plan professionally speaking, Danny is overjoyed with the work situation he has found himself in.

In 2018, Danny and his wife Nicole launched a personal professional endeavor, Rude-Rock Strength LLC. Originally designed to provide a platform for Danny & Nicole to publish infrequent articles and self-starter projects, RRSC has evolved into so much more. In under 2 years, RRSC has accrued just under 1,000 subscribers spanning over 40 countries globally. It has been such a fortuitous and gratifying experience for them, and they have enjoyed the endeavor tremendously. Given his lifelong history and love for sports, Danny's long-term goal is to work his way up to the NFL ranks, and hopefully one day work as the head strength coach for the Las Vegas Raiders.



**Nicole Foley (MS, CSCS, USAW)**  
Assist. Olympic Weightlifting Coach  
East Coast Gold Weightlifting  
Strength Coach, The Iron Asylum  
Twitter/IG: [@nicc\\_marie](#)  
Email: [info@ruderockstrength.com](mailto:info@ruderockstrength.com)  
YouTube: [Rude Rock Strength](#)

Nicole received her BA in Dance and Corporate Communications from James Madison University and her MS Ed. in Sport Management from Old Dominion University. From 2015–2019 she was the Head Coach of the Old Dominion University Dynasty Dance Team, capping off a 15-year career as a dance coach and instructor. She currently resides in Virginia Beach and is the proud wife of Danny Foley and (puppy) mom to Rudy and Rocky.

During her time at ODU, Nicole began an internship with East Coast Gold Weightlifting and was offered a job after graduation. Nicole is now an assistant coach and has developed and grown a youth/junior weightlifting program inside of ECG headquarters where she is also the Events Coordinator and Meet Director. Nicole is also the Co-Founder of Rude-Rock Strength and Conditioning and works as an independent contractor out of the Iron Asylum (Virginia Beach, VA), where she is a strength coach and the resident Olympic Weightlifting coach. She is recognized through the NSCA as a Certified Strength and Conditioning Specialist. Through USA Weightlifting she has received her Advanced Sport Performance certification and has coached athletes at the national level. Nicole is the Social Media/Marketing Coordinator for East Coast Gold Weightlifting and several other exercise-based companies. In 2018, Nicole and her husband Danny launched a personal professional endeavor, Rude-Rock Strength LLC. Details provided above.

## Tim Kelly (BS, CSCS, TSAC-F)

Assistant Strength Coach  
Virginia High Performance

Twitter: [@TK\\_757](#)

Instagram: [@timkelly2442](#)

Email: [tim@virginiahighperformance.com](mailto:tim@virginiahighperformance.com)



Tim played collegiate baseball at Virginia Tech and University of Maryland Baltimore County. Suffering a SLAP and rotator cuff tear (infraspinatus) became his motivation for getting into the field of strength and conditioning. He has worked at Virginia High Performance since 2016 serving as a Strength and Conditioning Coach as well as Facilities Manager. During his coaching time, he has worked with many athletes of all ages and varying degrees of injury and ability. From high school and college athletes to professionals as well as young children and senior citizens. Most notably he has worked with SCI (Spinal Cord Injury) and Nerve Damaged population helping to implement strength and conditioning protocols that improve their physical therapy regimens and quality of life.

Outside of coaching, Tim enjoys training martial arts, walking his dog, or kayaking with his wife. Almost all things outside of strength and conditioning are what give him the inspiration to learn and hone his coaching craft. He enjoys open discourse and will listen to any constructive point even if it may contradict his own philosophies.

## Jeremy Aspa (MS, LAT, ATC, USAW, CDNVLV1)

Assistant Athletic Trainer and  
Volunteer Assistant S&C Coach  
Hampton University

Instagram: [@Jeremy\\_aspa\\_at](#)

Email: [jeremy.aspa@gmail.com](mailto:jeremy.aspa@gmail.com)

YouTube: [Jeremy Aspa](#)



Jeremy has been involved in the sports medicine and strength realm since 2013. He has been providing care and training programming for the general public and athletes across multiple sports, training experiences, and age ranges. He's worked with high school athletes, college & professional athletes, and everything in between. He holds a bachelor's degree in sports medicine/athletic training and a master's degree in sport administration. His most recent experiences include holding the position as a graduate assistant athletic trainer for football, baseball, and men's soccer at Liberty University, has been the assistant athletic director for sports medicine at Virginia Union University, and currently serves as an assistant athletic trainer and volunteer assistant strength & conditioning coach at Hampton University. His mission is to provide the best athletic medicine care to for the people he works with as well as provide optimal training programs for all athletes and the general public.

*A note to our employer:*

On behalf of Tim and I, we would like to just take a moment to sincerely thank the ownership of Virginia High Performance. Without their unrelenting support and trust, none of what we are able to do professionally speaking would be possible. It is extremely rare to find a place of work that is so encouraging of professional growth and development. We both acknowledge and appreciate the autonomy this has provided us.

We've been very fortunate throughout our time with VHP, but it is times such as these with the COVID-19 pandemic where true character and leadership shines the brightest. I am extremely grateful to work under such fortunate circumstances. Our goal remains to represent the company with the utmost professionalism and acumen.



## TABLE OF CONTENTS

### 1.) **Shoulder Anatomy & Structure**

- The shoulder complex
- Scapula/ scapulohumeral Rhythm
- Rotator cuff
- Labrum
- OH Mechanics

### 2.) **Common Dysfunctions**

- Arthritis/bursitis
- Impingement
- Cuff tear
- SLAP tear
- Scapular dysfunction

### 3.) **Assessing the Shoulders**

- Movement screening
- Clinical testing
- Observations during gait
- Structure and function

### 4.) **Training Around Pain**

- Blood flow
- Motor control
- Parameter goals
- Influence of fascia and proprioception

### 5.) **Training Considerations**

- Emphasizing the Slings for Shoulder Health
- Why Landmine Variations are Great for Shoulders
- Principles of Rotational Training

### **Bonus Content**

- Well-Balanced Shoulders for Weightlifting
- Conjugated Approach for Shoulder Rehab

CLOSING

APPENDIX

REFERENCES

\***NOTE:** Accompanying training program and program instructions are found in second document attached in your email.

## WELCOME TO RESTORATIVE SHOULDER SERIES

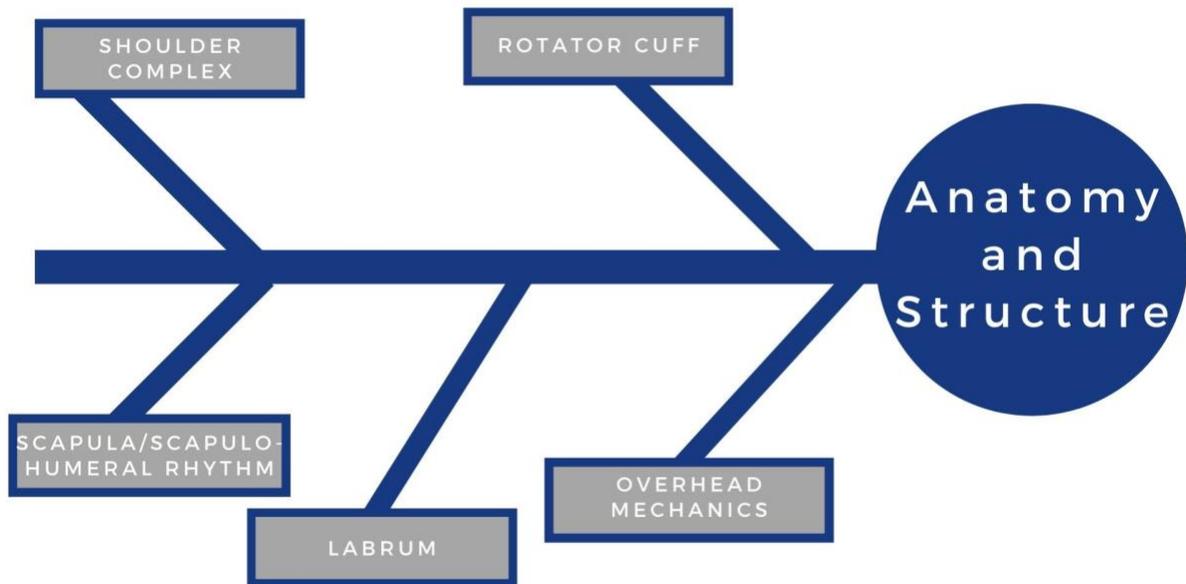
On behalf of all the contributors for this project, I would like to first thank you for taking the time to download and invest yourself in this product. Your support and trust in our content means far more to us than we can express. Although the format for this will follow closely to that of [Restorative Hip Strength](#), there will be some differences with this one. The operative point to RSS is the ‘*series*’ component. Considering the collaborative nature to this product, there is a nice blend of variety spanning multiple professional expertise/educational backgrounds.

The material found throughout this handbook, namely in the latter sections, will be presented as more of a *series* of articles, rather than continuous myopic text. It should be understood by the reader that this is not a textbook. If you are someone who lacks a foundational level of anatomy/biomechanics then I would recommend starting with sections 1 and 2. But if you’re proficient in these areas, there is no need to start this on page 1 and read straight through. In fact, *we encourage you to jump around and break it up*. Please be advised that there are quite a number of links provided throughout this text. Anything presented in [blue underlined](#) text is an embedded hyperlink for you to follow. The majority of these are to our own videos provided through our personal YouTube channels. Some of these are single exercise links, others are external discussions that is in sequence with the text. There are also some links provided to external sources. Please note we have no affiliation with any external sources, these are just companies or coaches we consider to be subject matter experts.

Understanding that in today’s world of information overdose and diminishing attention span, time really is of the essence. As such, our goal for this became simple- **make this consumable content that doesn’t demand too much of the reader’s time**. We felt very confident that by utilizing more graphics, charts, and video-based content in lieu of heavy text it would be more inviting for coaches and individuals to work their way through the entire handbook. There is a tremendous blend of methods, perspectives, and approaches found throughout this product. I believe that the variety makes the product as a whole not only more wide-reaching, but also more enlightening. It’s not the concrete, tangible material in this handbook that makes it great, the way in which the contributors discuss their work. We not only emphasized making the material informative, but also content that is authentic and pragmatic. Hopefully, we hit our mark.

I felt a prudent step in bolstering the quality of work would be to include people who are significantly better than I am with the subject matter. Having [Tim](#), [Nicole](#) and [Jeremy](#) agree to do this project with me not only made my workload much easier, but more importantly, *will make the product better for you as a reader*. I cannot speak highly enough of each of these individuals. I have known each of them for quite some time, and apart from being some of the best coaches in their respective industries, they are truly some of the best humans I have ever been fortunate to know. I am extremely grateful to have them in my life, and a part of this product. We hope that you enjoy this product as much as we did putting it together. -DF

# SECTION 1



Contribution From: Danny Foley, MS, CSCS\*D

## The Shoulder Complex



Image 1.1- Illustration of the four joints that make up the shoulder complex (Image via Physio-Pedia)

The shoulder is the one of the most unique and sophisticated joints found throughout the human body. Often lumped together, the shoulder is actually made up four distinct joints. The primary of them being the glenohumeral (GH) joint, which is a true synovial ball and socket joint permitting a large degree of movement (5). But the shoulder also includes the sternoclavicular (SC), scapulothoracic (ST), and acromioclavicular (AC) as shown below.

These joints, with exception to the ST joint, are held together by ligamentous attachments to provide stability. The shoulder (GH joint) is the most mobile joint found in the body (19), and consequentially, lacks fundamental stability. The predominant stabilizing structures for the shoulder is the musculature that surrounds the area, for instance the rotator cuff. However, enveloping the GH joint, we have an articular capsule that is designed to provide passive stability to the area (19). In addition to passive stability, the fibers of the articular capsule work in coordination with the GH ligaments to provide anterior extensibility and secondary stability at extreme ranges of motion (15). The capsule is coated in a layering of synovial membrane to promote frictionless gliding across the loose articular capsule as the humerus moves (33).

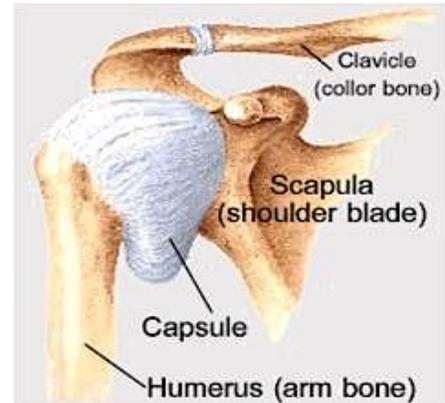


Image 1.2- Animation of the articular capsule found at the glenohumeral joint (Image via Orthopedic Neuromuscular)

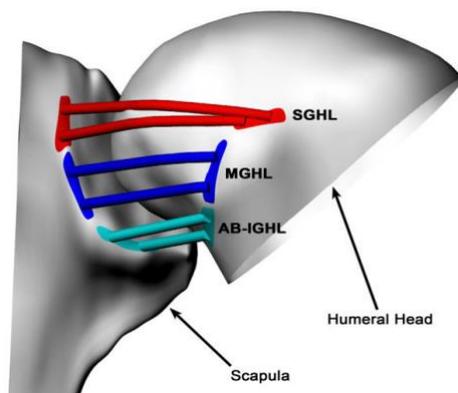


Image 1.3- Animation of the three glenohumeral ligaments (Anterior view). SGHL= Superior Glenohumeral Ligament, MGHL= Medial, IGHL= Inferior (Image via Massimini et al.)

Beneath the capsule, we find the three prominent GH ligaments (shown to the left), which are classified as superior (red), medial (blue) and inferior (green) bands. These bands help to reinforce the articular capsule and provide stability to the joint. Similar to the capsule, these ligaments are relatively thin and do not provide a high degree of stability, however, they of course serve their purpose. Similar to the hip, the “socket” component of the shoulder (glenoid) is encircled by a labrum. The labrum is a fibrocartilaginous connective tissue designed to increase the articulating surface area by deepening the socket (15) and preserve the continuity of the joint. An important note on the glenoid labrum is that it also serves as a landmark attachment site, including the insertion point for the long head of the biceps tendon (32). This helps demonstrate

the importance to the labrum in regard to providing anterior-superior stability of the GH joint. This also, in part, helps explain why the glenoid labrum is so commonly damaged and injured. Labral damage is exceptionally common, some studies reporting up to 78% of the population having asymptomatic labral tears (23). However, even though asymptomatic, this disruption can be a major culprit in optimal shoulder function, including ability to get into a good overhead flexion pattern or ability to tolerate eccentric forces.

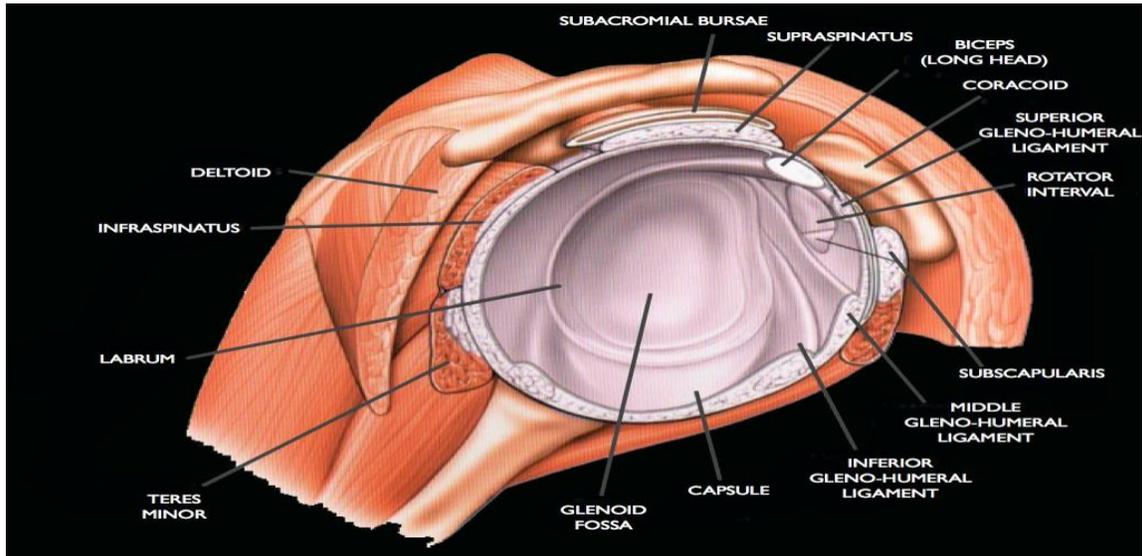


Image 1.4- Illustration of the glenoid labrum (frontal plane view). (Image via Seattle Cloud)

## Scapula

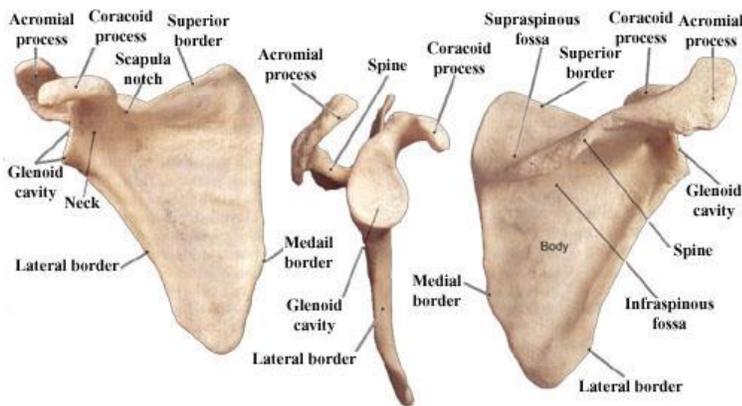


Image 1.5- Multiplanar animation of the scapular identifying the major bony landmarks which serve as key muscular attachment sites. (Image via Corewalking.com)

What particularly adds a unique aspect to the shoulder complex is the scapula. The scapula, which is a thin, flat triangular-shaped bone that does not have a true articulation (21). The scapulothoracic joint is technically a *floating* attachment, as it is intervened by the subscapularis preventing contact with the rib cage. Despite this being a false joint, a remarkable amount of muscles and connective tissues attach on the scapula. For most individuals, about 17 muscles attach to the scapula, including the lat for about 40% of

individuals (13). The majority of these attachments can be found on the three bony processes of the scapula: spinous process, acromion, or coracoid (21) (See [Appendix 1](#) for complete list of scapular muscles). The particular shape of an individual's scapula can have significant impact on training outcomes. This is of course in conjunction with the resting and dynamic postures/positions of the scapula as well. But what we want to pay particular attention to is where the acromion process sits. Generally speaking, there are three acromion shapes that can be found, those being classified as either type 1 (flat), type 2 (curved), or type 3 (hooked) (21).

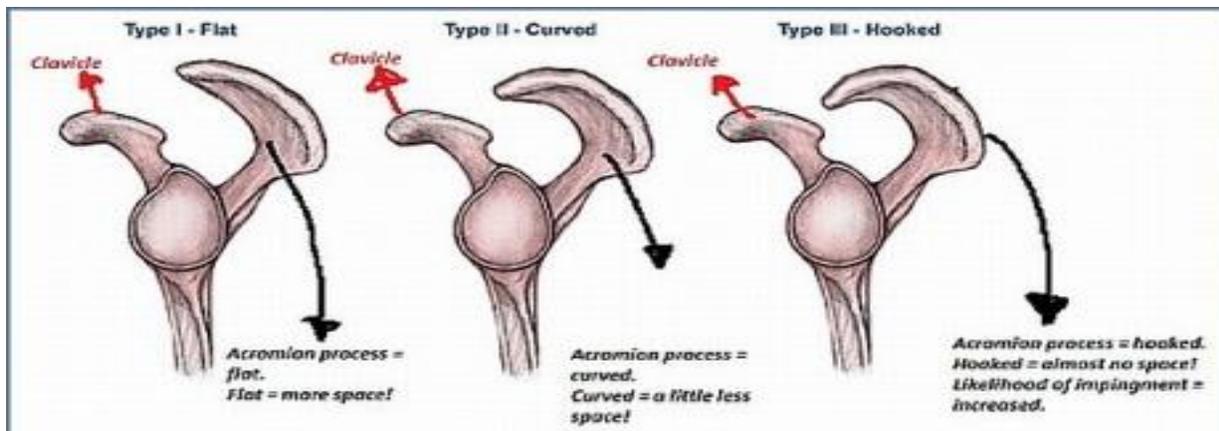
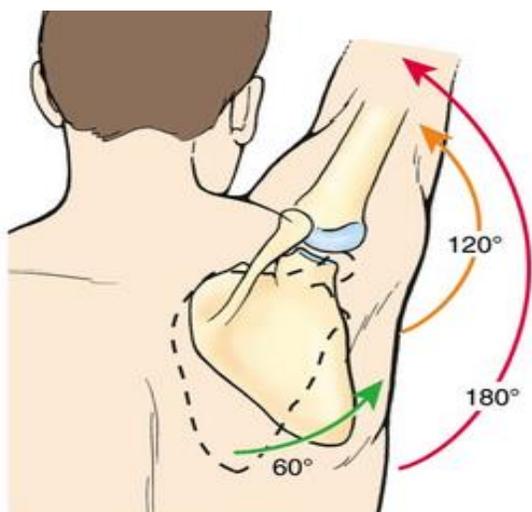


Image 1.6-Animation showing the three prominent types of acromial shapes. (Image via physiopedia.com)

The takeaway point being, the shape of the acromion is going to inherently govern certain ranges of motion or freedom of movement. Now of course, we can't definitively determine what shape someone's acromion process is without imaging, but we can certainly palpate the area and get a general feel for the shape and surrounding space. The acromion is an attachment site for several muscles and connective tissues (i.e. long head of biceps, deltoids, & traps), along with being a part of the AC junction (commonly injured in football athletes). Just beneath the acromion, we have another significant bony process that is the coracoid process. Like the acromion, the coracoid process is a key attachment site for several muscles and connective tissues (i.e. pec minor & short head of biceps). Between these two structures, we have what's known as the subacromial space or sulcus (14). This area is often closed off or *impinged* due to repetitive stress, aberrant motor patterns/postures which can incite localized pain and/or inflammation.



**Scapulo-humeral rhythm.** The scapula and humerus move in 1:2 ratio. When the arm is abducted 180 degrees, 60 degrees occurs by rotation of the scapula, and 120 degrees by rotation of the humerus at the shoulder joint.

Image 1.7- Animation of the coordinated movement involved between the scapula and humerus. (Image via Physio-Pedia)

Perhaps more significantly, there is an inextricable sequence or coordination between arm and scapular movement, known fittingly as scapulohumeral rhythm. Optimally, we want to see about a 2:1 ratio of GH:Scap movement (31). What we often see with athletes, even in healthy conditions, is a disruption to this scap:humeral rhythm, which can either impair fundamental patterns, incite localized pain, or compromise performance. In order to optimize GH function and mechanics, we must have optimal scapular positioning and movement **first**. As Eric Cressey often likes to say- "*scapular function dictates arm action.*" Or to put it another way, the greater the disruption to scapular function the harder the GH joint is going to have to work for itself or around inefficient scapular movements. And the harder the joint has to work for itself, the greater the damage on the capsule, labrum, rotator cuff, and connective tissues surrounding the joint becomes.

The scapula has somewhat peculiar paths of motion, given its shape and orientation. The primary actions of the scapula include protraction/retraction, elevation/depression, anterior/posterior tilt, upward/downward rotation, and ab-adduction (shown below). What's more, each of these scapular movements has an accompanying humeral movement, as alluded to above with the rhythm. For instance, when the arm abducts, the scapula adducts or when we go into humeral extension, the scapula downwardly rotates (7).

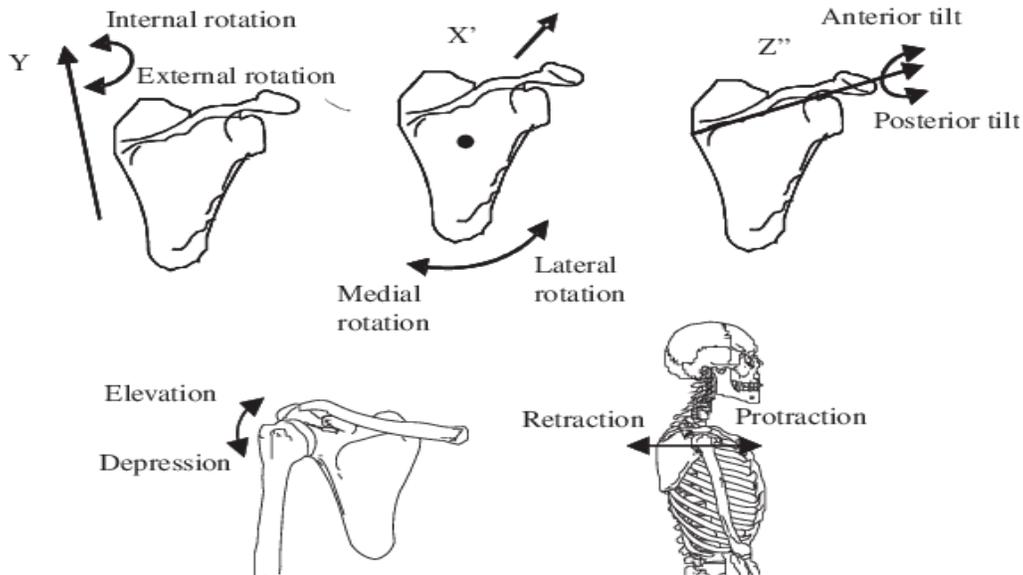


Image 1.8- Illustration of the multiplanar movements of the scapula. (Image via Computer Methods in Biomechanics and Biomedical Engineering)

### Rotator Cuff

The rotator cuff is a common term referring to four muscles of the shoulder that collectively wrap (or *encase*) around the GH joint, providing stability to the broad range of movement found at the GH joint. The muscles that make up the rotator cuff include the supraspinatus, infraspinatus, teres minor, and subscapularis (5). A good way to remember these is the acronym **SITS**. The muscles of the cuff have very distinct positioning as shown below, and thus very distinct function. The primary movements of the cuff include abduction (supraspinatus), external rotation (infraspinatus/teres minor), and internal rotation (subscapularis) (29).

Muscle	Primary Action	Secondary Action
Supraspinatus	Humeral Abduction (0-15°)	Synergist to humeral abduction (15-90°)
Infraspinatus	External rotation	Humeral extension
Teres Minor	External rotation	Assists in extension and adduction
Subscapularis	Internal rotation	Assists in humeral extension and depression



Image 1.9- Animation of the rotator cuff muscles. (Image via The Prehab Guys)

But the general or collective function of these muscles is providing structure and stability to the GH joint. When the cuff muscles are weak individually, the surrounding muscles (or other cuff muscles) will often “pick up the slack” and overcontribute to movement. Moreover, when the collective group becomes weak or atrophied, the surrounding structures (i.e. lat, triceps, scapula, neck, thoracic spine) become chronically overworked thus destabilizing the joint and propagating likelihood for injury or setback. For more explicit actions/functions of the cuff muscles, refer to [Appendix 2 and 3](#) for details.

When we have athletes coming off of injuries such as rotator cuff or labral tears, we will often see significant reductions in scapular movements. The deficits occur most commonly in protraction, upward rotation, and anterior tilting (7). On a less intense scale, we will also see cases where athletes become overly dominant in the trap muscles. This tensing or *guarding* can compromise scapular function by impeding actions such as upward rotation, which is demanded in overhead flexion or retraction and downward rotation during humeral extension.

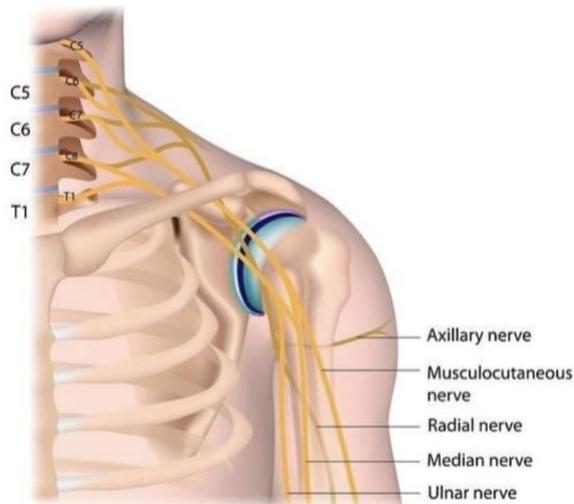


Image 1.10- Animation of the brachial plexus, which is one of the many major structures innervating the shoulder. (Image via Human Kinetics)

The shoulder complex is commonly referred to as a “claustrophobic” joint (see [Appendix 4](#)). What this is alluding to is the remarkably high amount of structures that innervate the shoulder. There are several vascular structures (brachial artery, carotid artery), nerve fibers (brachial plexus), and connective tissues found throughout the shoulder complex. There are also several bursae sacs found throughout the shoulder. A bursa is a synovial fluid sac, providing a cushion or buffer between the tendons and other joint structures (5). In total, there are eight bursae found throughout the shoulder complex, which is more than any other joint in the body (20). A lesser known fact about bursae, is that they have both a nerve supply and mechanoreceptors which are designed to provide pain and

proprioceptive feedback (12). I believe this is a major hint as to why undiagnosed, or non-specific shoulder pain can often be irritation or disruption to a bursa sac. In a lot of these cases, bursitis (being overlooked) can be mistakenly diagnosed as things like impingement, tendonitis, or even mistaken for tears.

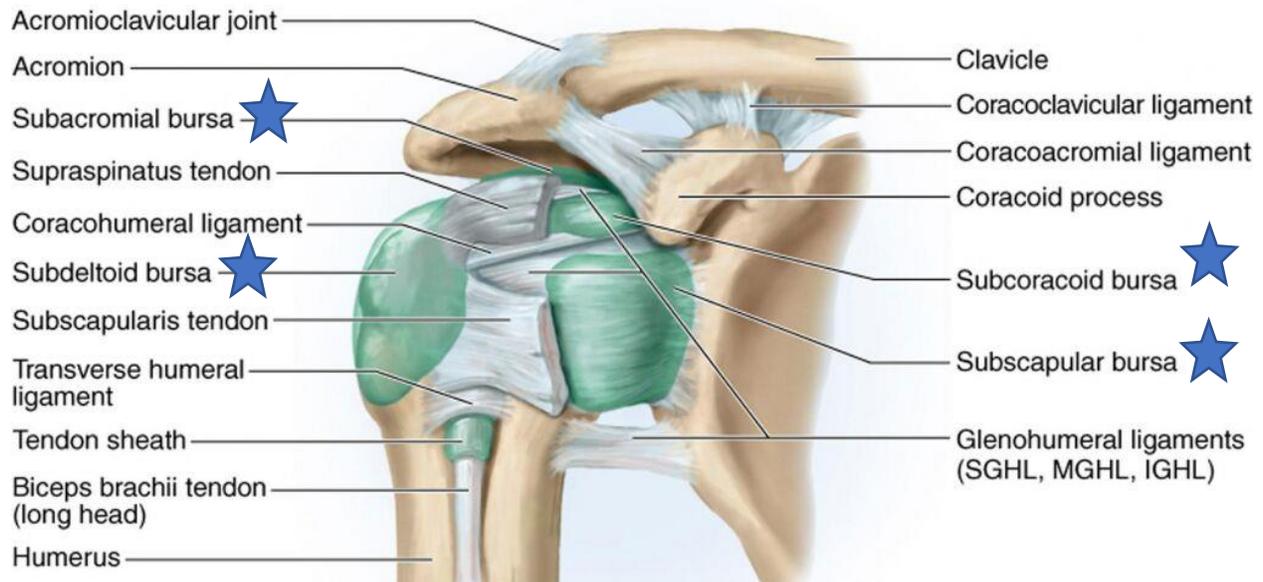


Image 1.11- Animation of the shoulder complex with emphasis on the four main bursae found in the shoulder. (Image via Anatomy Notes)

### Additional Key Variables

What optimal shoulder health and function ultimately come down to is **keeping the ball on the socket** (another common Cressey-ism). That being said, our job as strength coaches or clinicians is a continuous evaluation of how and where movement is coming from, and what the continuity of the joint looks like. Identifying the weak links in the chain and cleaning up impaired or incomplete movements and addressing them. Much of this is guess work, or at least for me it is. It's a constant trial and evaluation of manipulating variables, trying different movements in different ways and seeing how the athlete responds.

Not to undermine their work in any capacity, but the roles and responsibilities of the physical therapists and athletic trainers of the world are pretty cut and dry. They have an exact timeline of how the injury *should* be healing. With such tremendous advances in technology and practice, these protocols have become remarkably refined, predictable, and scalable. When an athlete has a surgically repaired labrum, the practitioner knows there should be linear improvements over the timeline. This gives them foresight of what precise degrees of motion the athlete can work up to, how much or little stress should be applied, and when to add new stimuli throughout the process. Again, make no mistake about it, their work is far more complex and sophisticated than I'm capable of by a long shot. But the predictability for them is a decisive advantage.

Much of my work comes well after the clinical rehab phases have been completed and, really, has become that of finding the shortcomings of conventional rehabilitative methods. The broad tangible aspects typically involve improving passive and active ROM, improving general stability and restoring baseline strength tend to be the primary focal points. Because the athletes I work with are so far removed from their early phase rehab, it creates an enormous spectrum of problems and deficiencies I come across- as all athletes do not respond to the same injuries/ surgeries the same. The combination of variables creates a bit more ambiguity with applications and methodologies. Or in other words- *I've seen some shit*.

When there is dysfunction at the shoulder, albeit coming off of surgery from a specific injury or just generally degraded shoulders, there is inherent involvement from a few muscles. The lats, traps, deltoids, biceps, triceps, pecs, rhomboids, and all muscles of the core are prominent influencers of both GH and scapular function. For the sake of brevity, let's pull out just a couple of these and look with a bit more detail. Fittingly, I'll start with the core.

I've always felt like I've struggled with the shoulders. I don't know why, but I've never been as confident as say compared to a hip injury. Needless to say, I've had to do my fair share of homework. An inherent consistency I began to notice amongst all of my go-to experts was that much of optimizing shoulder function is reliant on a strong, stable core. If we lack requisite core strength and stability/motor control, we're going to make it more difficult and demanding to restore the shoulder completely. It will make the process inefficient and incomplete at best trying to rehab or strengthen an injured shoulder complex while lacking core strength. There, I said it.

**"Proximal stiffness for distal speed."**

~Stu McGill~

But stepping down from my high horse, think about it like we do just about anywhere else in the body- *proximal to distal*. We always want to ensure we have sufficient stiffness where needed, and mobility where needed throughout the spine and torso. As it relates to the shoulder, we need to consider the function of the thoracic spine being mobile enough to permit shoulder function while having sufficient stiffness in the lumbar spine to support it. And the way to establish this, is adequate and appropriate core training early on in the training process.

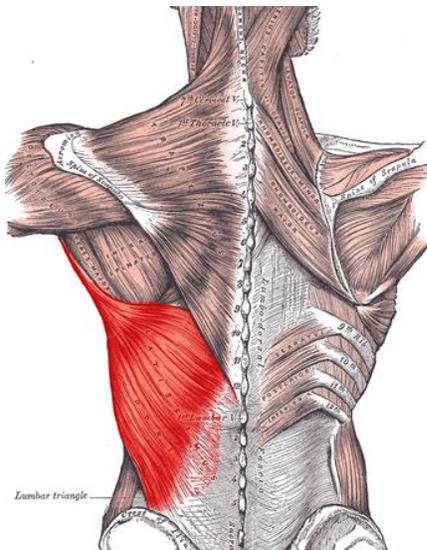


Image 1.13- Illustration highlighting the anatomy of the lat muscles. (Image via Sports Rehab Expert)

The lat is an enormous muscle that spans from the bicipital groove on the anterior surface of the humerus all the way to the thoracolumbar fascia and/or iliac crest (*in some individuals*) (16). There are several muscular actions at play here, most prominently GH extension, GH internal rotation, and adduction (5). However, the lat is also a synergist in trunk extension, and in some cases hip extension. Given its interaction with the ribcage, the lats are also a factor for respiration (7).

What we will commonly see with athletes coming off of injury is excessive tone surrounding the lateral-inferior border of the scapula and excessive tonicity (tightness) inhibiting contribution from the lat in overhead flexion or as an internal rotator. This can be a consequence of time spent immobilized in a sling, or from self-derived compensation patterns. Conversely, what we often see in otherwise healthy athletes is chronic lat stiffness due to overdominance. When the lat becomes overly dominant, not only do other more refined muscles (i.e. teres major/minor, long head of triceps) become atrophied due to lack of activation, but the lat muscle can become fibrotic and functionally shortened (2). As a result, athletes can have a difficult time getting into proficient overhead patterns or rotational movements.

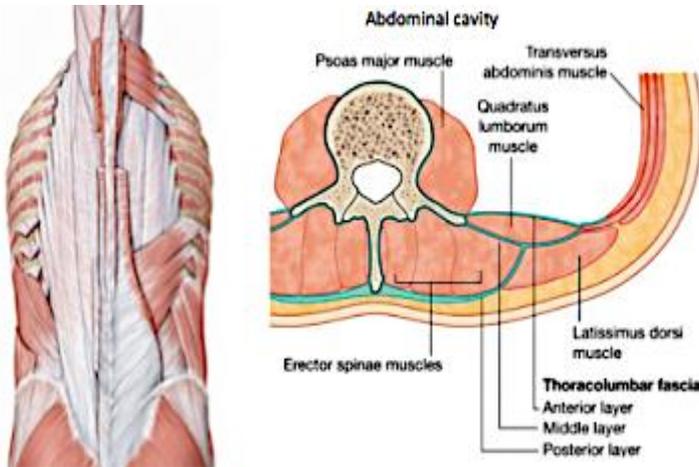


Image 1.14- Animation of the thoracolumbar fascia, which envelops some critically important core structures. (Image via Study Blue)

An added consequence to lat overdominance is the effects at the thoracolumbar junction. When the lats become functionally short, one of two outcomes can arise- I.) undue stress is placed on the lumbar extensors, which can create an exaggerated or unfavorable lordotic posture or II.) the lats contribute excessively to lumbar/hip extension and downregulate erectors/QL (16). In either case, we have disruption to the posterior chain that indirectly compromises the function or freedom of the shoulder.

The serratus anterior (SA) is another muscle that we want to give explicit consideration to when we're restoring shoulder strength and optimizing function. The primary role of the SA is protracting the scapula and also assisting in upward rotation (5). However, the SA also acts on the rib cage by assisting in elevation when the scapula is fixed, and also assists in humeral flexion (30).

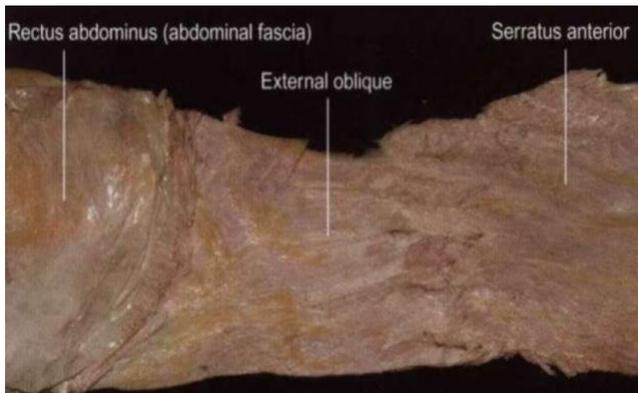


Image 1.15- Dissection of the serratus anterior muscle and fascia, demonstrating the direct and inextricable link between scapular function and the anterior core (Image via Anatomy Trains 2nd ed.)

If we chase even further down the SA anatomy rabbit hole, it also has a direct fascial attachment that intertwines with the pec minor, external oblique, and rectus abdominis (16). One of the primary functional considerations with the SA is that of scapular protraction and positioning. But we cannot ignore the influence the anterior core has with scapular function. The absence of scapular movement (i.e. immobilized, impairment) results in downregulation for the SA, causing weakness and atrophy. If the SA isn't adequately addressed, athletes will have a very difficult time achieving

complete overhead flexion patterns (properly executed), and certainly not under any significant load. It's imperative that we know where movement is coming from in any case, but considering the complexity to the shoulder, it's especially paramount. And the SA is a commonly underdeveloped and undertrained muscle in both healthy and injured populations.

The last additional variable I wanted to touch on is the traps, and in two distinct points. The first being exactly what we discussed with the lat- overdominance due to chronic muscle guarding. You'll sometimes hear coaches say something like "*the scapula is just hanging on to the trap*" or being "*glued*" to the trap muscle. What this is inferring is that the traps have taken over too much of scapular control, which again downregulates smaller muscles that are more apt for the job.

With this, a common maladaptation is using the upper traps to “pull up” to stabilize overhead flexion, as shown above. What we want to see in an overhead flexion pattern is achieving predominantly through deltoids and pecs initially with accompanying scapular protraction, upward rotation, and anterior tilt and then stabilized through the lats. When we pull or crank through the traps, the scapular action becomes impaired or incomplete often resulting in an ugly overhead flexion pattern.

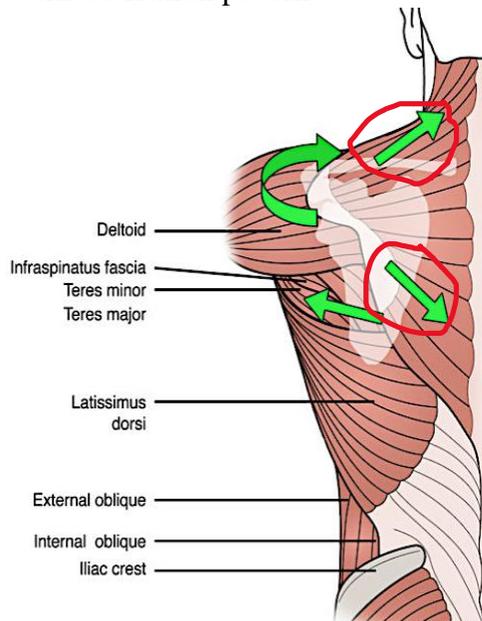


Image 1.17- Great illustration demonstrating the reciprocal actions of the upper and lower fibers of the traps. (Image via Sports Injury Bulletin)

The second distinction I wanted to outline with the traps is the neglect of the lower trap muscles receive, and how important it is to distinguish between the two. The primary functions of the upper trap muscle are scapular elevation and some upward rotation. The lower trap, conversely, is responsible for depression and retraction, and also posteriorly tilts the scapula (31). I really love the image to the left because it shows a good illustration for the complete opposite functions of the upper and lower traps. It’s incredibly important that we distinguish between the two and should absolutely be treated independently for exercise selection and programming considerations. The compensations for lacking lower trap development are no different than any of the other individual deficiencies that we’ve discussed- lower trap isn’t pulling its weight (i.e. posterior tilting, downward rotation) so *something else* must pick up the slack. When the upper fibers become overly developed, scapular movement becomes incomplete.

## Fascial Slings

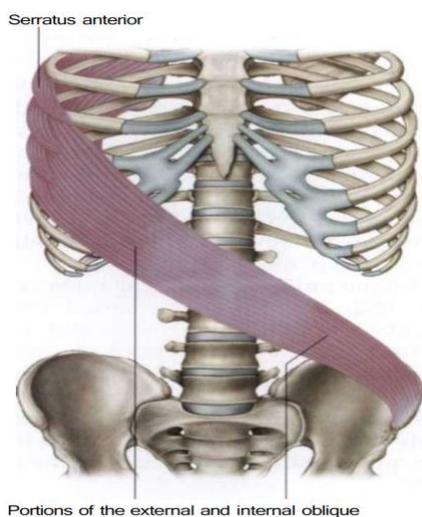


Image 1.18- Animation of the anterior sling which spans the torso in diagonal fashion like a seatbelt. (Image via Anatomy Trains 2nd ed.)

You knew you weren’t going to be able to get through one of my publications without hearing about the fascial slings! Facetiousness aside, the anterior, posterior and lateral slings are critical variables to accommodate for when discussing optimizing shoulder function. I don’t want to get too deep on this, as there’s a whole segment on the slings found later in this manual, but let’s cover some basics. The anterior sling includes the serratus anterior and contralateral adductor whereas the posterior sling includes the lat and contralateral glutes (18). As for the lateral chain, which is shown in the image below, this essentially includes all of your major frontal plane movers- lats, obliques, glutes, and adductors. The main consideration with the slings in regard to shoulder health and function is how the tension (or lack thereof) is affecting the resting and working positions of the shoulder girdle.

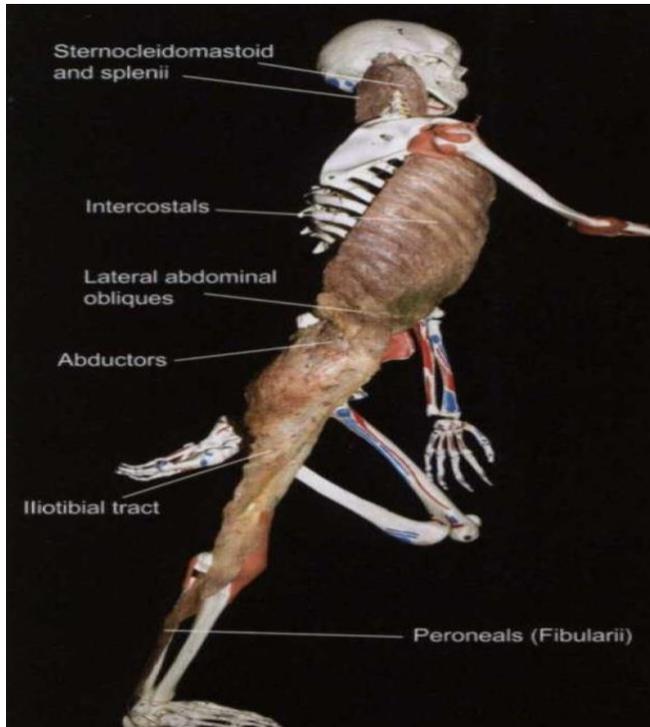


Figure 1.19- Another incredible image from Anatomy Trains showing the lateral fascial chain. (Image via Anatomy Trains 2nd Ed.)

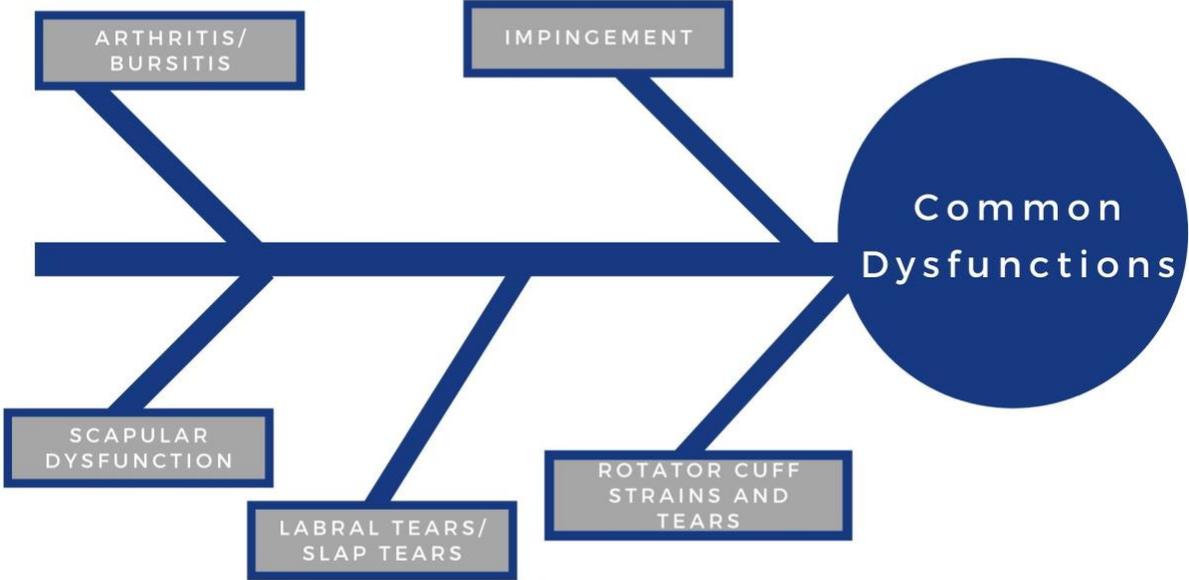
The primary properties of fascial tissue include elasticity (ability for tissue to store and release kinetic energy), plasticity (ability for tissue to distend and return to form) and viscosity (ability for tissues to glide against one another) (18). All we need to know for now is that immobilization is about the worst thing we can do for the fascial system. Not only do we compromise all of the outlined properties above, but we also desensitize the proprioceptive bodies that are found in extraordinary amounts in the fascia throughout the body (16). Again, we'll look at fascia in much more detail in section 5, but the fascial slings are game changers for optimizing the shoulder.

# 3 MAJOR



- 1.) Shoulder complex is made up of four major articulations. The GH joint, the most mobile joint in the body relies on surrounding structures for primary stability.
- 2.) The labrum is a fibrocartilagenous ring encircling the glenoid fossa which deepens the socket to promote greater ROM.
- 3.) Four muscles make up the rotator cuff (SITS). Collectively, their primary role is to provide structure and dynamic stability to the joint.

# SECTION 2



Contribution From: Danny Foley, MS, CSCS\*D

As we can see, there is quite a bit going on at the shoulder complex. With so many structures surrounding and innervating the joint, it should be common sense to infer that this presents a lot of opportunity for injury and/or dysfunction. In addition, it should also illustrate the host of variables that need to be monitored in strength training. It is well beyond the scope of this manual to delve into the gamut of injuries that are found at the shoulder, as well as discussing pathology and diagnosis. Remember, I'm just a strength coach talking to strength coaches here... so, for the sake of this section please bear in mind: **I am not a doctor, not a physical therapist, and in no way shape or form should you self-diagnose or treat present injuries based on the insights shared throughout this manual. I cannot overstate enough that your direct treatment should always be revised and prescribed through your doctor, athletic training staff, or physical therapist.**

What we, as strength coaches, want to invest our time into is the *movement diagnosis*. The job of clinicians, doctors, etc. is to prescribe *medical* diagnoses. Our job is to utilize the medical diagnoses as a boundary and a guideline, and our own movement diagnoses to identify what needs work and improve what we can. To narrow the focus of this section, I wanted to focus predominantly on what I see and work with most often. Those being:



### Arthritis/bursitis

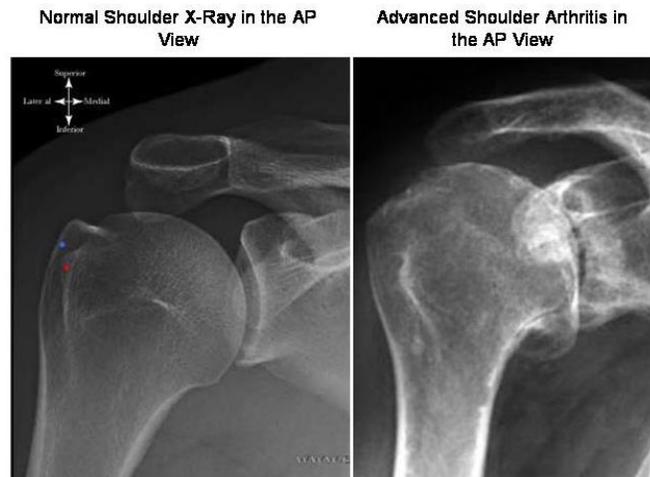


Image 2.1- X-ray imaging showing the degenerative changes at the shoulder. (Image via Boston Shoulder Institute)

Arthritis, although more complex and variable than most are aware, is defined as an acute or chronic joint inflammation that can incite pain and irreversible degeneration to the joint if it goes untreated (3). Another common misconception with arthritis is that it is only found in elderly populations. This is simply untrue. According to (3), arthritis is diagnosed in about 7% of individuals between 18-44 years old. For reference, the CDC suggests about 30% for 45-64 and 50% for those 65 years old and up. When we consider arthritic conditions among younger athletes there are a few key variables. The first, is

anthropometrics and structure of the joint. For instance, a type III acromion causing premature bone on bone contact which predisposes the athlete to excessive bone-on-bone stress. Other key variables at play (especially with younger athletes) are exposure, repetitive stress, and overuse. To pull a couple of easy examples here, think about baseball players who specialize early and military athletes. Over time, without proper training or rehab to accommodate for the accumulation of repetitive stressors, arthritis can become more of a risk for these athletes. I personally believe early sport specialization is a major factor and should always be considered from a long-term perspective. The body demands variety, balance, and undulation. And for those reasons alone, early specialization just doesn't make sense to me.



Image 2.2- Illustration showing the presence of subacromial bursitis. (Image via Physioworks.com.au)

Bursitis is another common irritation to the shoulder that typically develops chronically after accumulation of repetitive undue stress. When bursitis is present, the athlete may not be overly restricted in *attaining* ranges or paths of motion, however, it also won't take much to induce sharp pain or residual inflammation. One of the more common types of bursitis found at the shoulder is subacromial- the acromion type again being a variable here. The trouble with bursitis is that it's one of those things where you can "push through", but at what cost? Similar to others (i.e. arthritis/impingement) bursitis will not alleviate without the appropriate rest and requisite training adjustments. The one tangent with bursitis is that there is risk for developing subsequent bacterial infection if gone untreated (22). While

this is far from common, it's good to know that the subclassifications to bursitis are either septic or aseptic, when septic, there is risk for bacterial infection (22).

### Impingement

There are two broad classifications of shoulder impingement known as either internal or subacromial impingement. The first, external (also referred to as subacromial) impingement is the more common of the two and is described as excessive or repetitive contact between the posterior aspect of the greater tuberosity of the humerus and posterior-superior aspect of the glenoid (10). This impinges on the tendon of the cuff muscle (typically supraspinatus). The second impingement type is internal. When external (subacromial) is more structural/postural based, true internal impingement is only really found in overhead athletes. The excessive bone-on-bone contact promotes likelihood for secondary outcomes such as damage to labrum or cartilage.

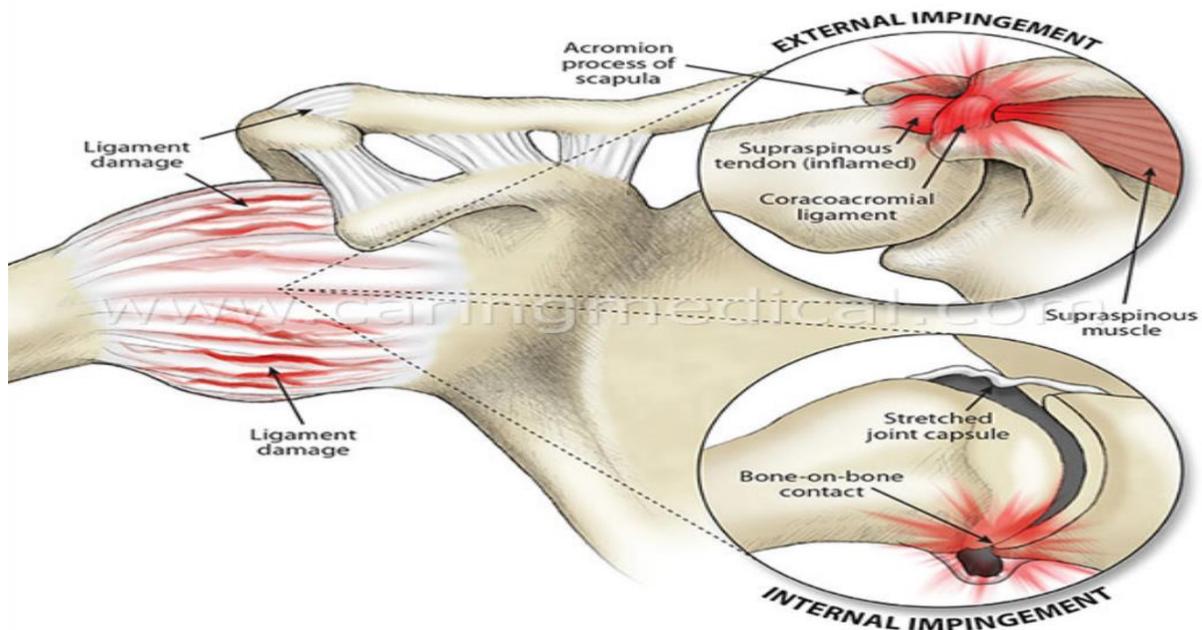


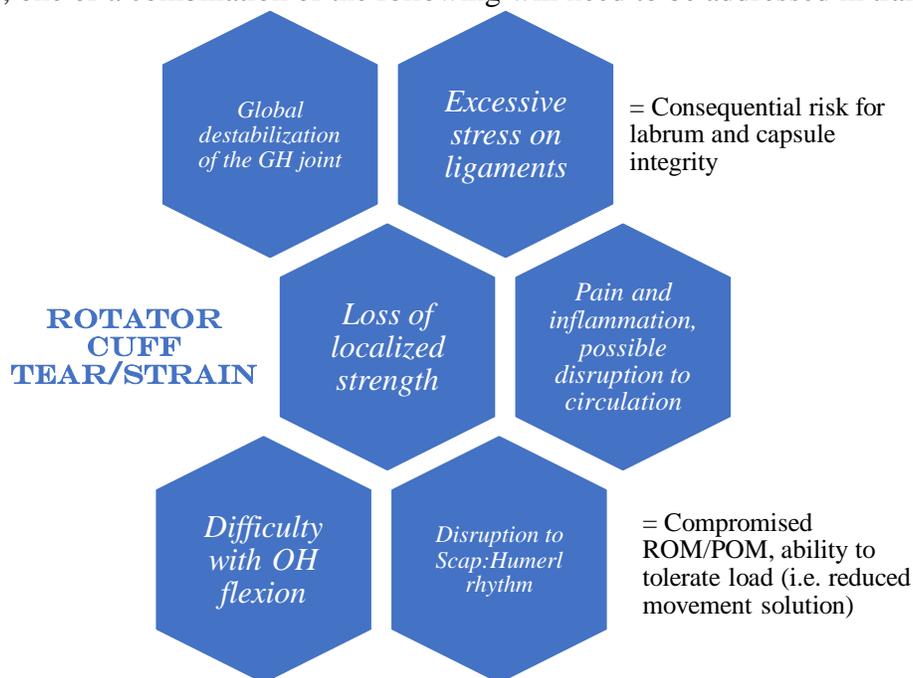
Image 2.3- Illustration showing two types of impingement. As shown, with external we have compression on cuff tendons by acromion. (Image via Caring Medical)

There are no explicit associated risk factors, however, it can be reasonably assumed that the primary factor is repetitive, overuse actions/training/exposure. Baseball pitchers again being the obvious and easy example for internal impingement candidates, as the rapid eccentric forces and amount of torque being placed on the glenohumeral joint are profound. In reality, it's only a matter of time before impingement becomes likely for this crowd, no matter how the training is tailored with this population. But as described by (20), internal impingement becomes magnified with excessive external rotation, anterior capsule instability, scapular imbalances, or repetitive overload to rotator cuff. Irrespective of the classification, a major component to restoring impingement is managing training volume and exercise selection in accordance with proper soft tissue modalities and sufficient rest to manage inflammation and allow pain to subside.

Impingement is tricky, and a topic that is highly debated due to the amount of asymptomatic cases of impingement. In my opinion, it should be treated by the strength coach as an injury site until otherwise demonstrated. Meaning, if we have someone who tests positive for impingement during our movement screen, approach the area cautiously, but don't throw overhead or pressing movements completely out the window. Sometimes it's a motor inhibition problem or sometimes just a factor of time. An important aside to clarify what I mean by rest, which is often confused for "do nothing" and that shouldn't be the case. Rest is relative to the athlete first and the area of concern second. So, we simply dial back training intensity, volume or other variables to meet the state of the athlete. Rest is obviously a necessity to successful training, but it shouldn't be confused for "avoidance".

### Cuff Strain/Tear

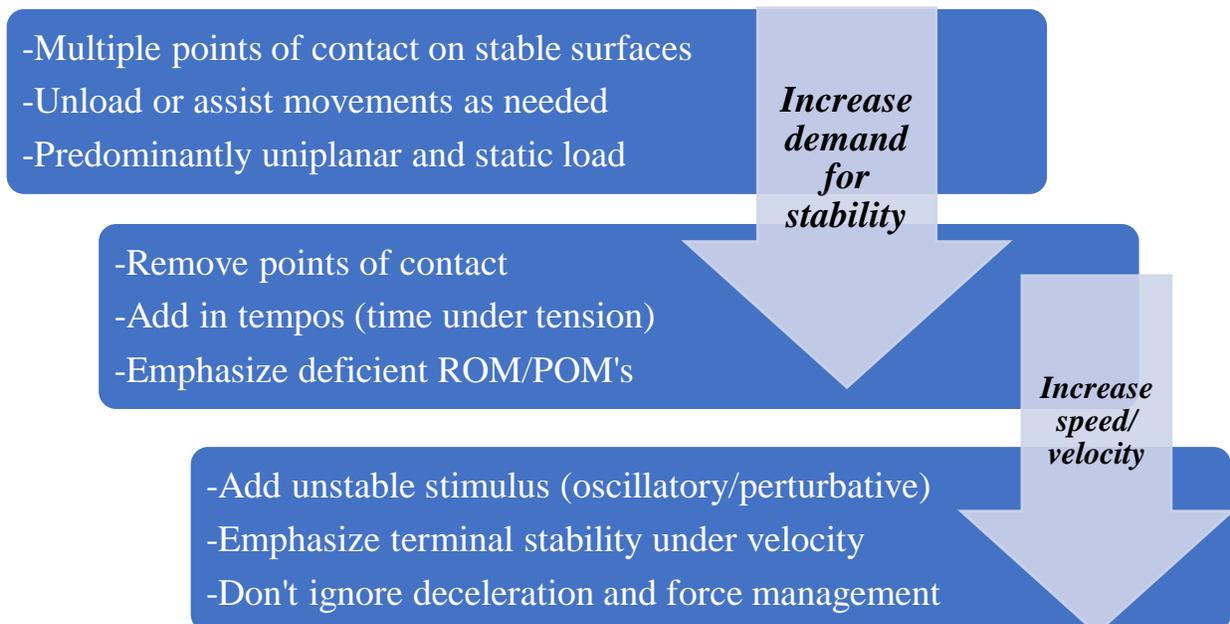
As outlined in section 1 the primary function of the rotator cuff muscles is to provide dynamic stabilization of the GH joint, particularly in overhead actions. Unlike the items outlined above, there is typically a more specific and acute injury mechanism with rotator cuff injuries. As such, they are somewhat more controllable and linear in training. We know with a strain or tear to the cuff muscles, one or a combination of the following will need to be addressed in training:



The difficult part, however, is understanding how much stress is appropriate and how much volume the area can endure. On paper this always looks clean and linear, but in practice that's rarely the case. I suppose this is where the "art" side of coaching becomes elucidated. We've already established that the ultimate, empirical goal of restoring shoulder strength and function is rooted in keeping the ball on the socket and developing strong, stable structures to work from. Additionally, we've also identified that the muscles of the cuff each have distinct positions, thus specific functions. Our training approach should be developed based on these simple points. What we need to consider first is what the athlete shows us during their assessment. Where do they show that they're weak or deficient? What ranges or planes of motions are incomplete or impaired? From there, we just remain cognizant of getting the muscles and areas in question to **do what they're supposed to do**.

Although there is no clear or simple route we can take when restoring rotator cuff injuries, we want to have a thorough base to work from. The degree of injury, how many muscles of the cuff are compromised, and how the surgical procedure was performed are all preliminary variables that influence where to start. An additional consideration being how strong and stable the joint was prior to the injury occurring. Taking this in stride, we want to focus our initial efforts on improving localized strength, active ROM, and work to improve general stability of the area.

With stability work, our primary consideration is where the athlete is with passive and active ranges of motion. The emphasis here being that we don't want to work beyond (i.e. ranges of motion) what the athlete is capable of. My personal opinion on this is we want to first strengthen and stabilize the ranges of motion the athlete has- whatever those degrees of freedom may be- and **then** work on increasing the ROM as a secondary measure. A simple way I've gone about this is thinking "*own what you have before you buy more*". Nevertheless, the chart below outlines the general parameters of how I go about progressing stability movements.



## Labrum/SLAP Tear

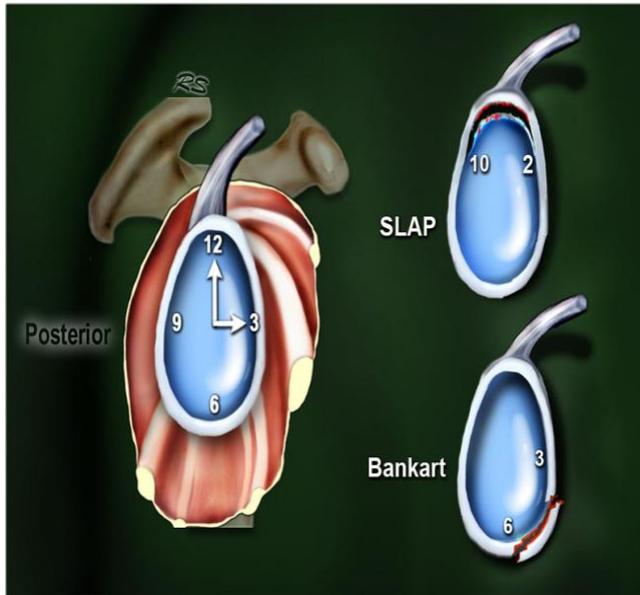
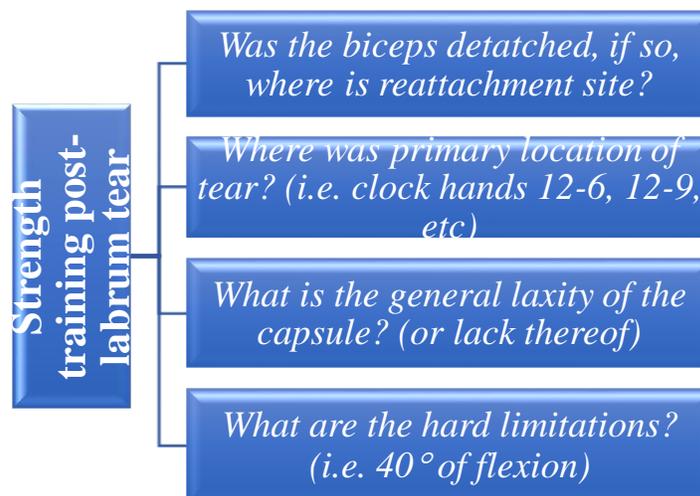


Image 2.4- Animation showing how tears of the glenoid labrum can be perceived like the hands of a clock. (Image via The Radiology Assistant)

Labral tears, like most injuries, can occur in acute or chronic fashion. Generally speaking, labral tears are more commonly torn over time, commonly being cited as *overuse* injuries. Speaking anecdotally here, the tricky thing with labral tears is that they seem to present very differently across different individuals. For some individuals, they have almost zero limitations post-op, for others, the shoulder will never be fully restored to full health. Nevertheless, a good way to envision the labrum is to think of a washer sitting flush between a bolt and nut. The labrum effectively provides depth to the socket, allowing for greater ROM, along with promoting optimal continuity at the socket. For more detail regarding the four main classifications for SLAP tears, please see [Appendix 5](#).

We also have an additional measure for assessing the degree of SLAP tears that can be useful insight for training. Considering the circular structure of the labrum, tears can be analyzed like the hands of a clock (shown below). The varying surgical procedures for SLAP tears are broad and can be determined by when the date of the procedure occurred as procedures have changed over the years quite a bit. The more common procedures include minimally invasive arthroscopic debridement, a Mumford procedure, or a biceps tenodesis which is a procedure that cuts the biceps to reattach elsewhere (i.e. lower attachment on the humerus, re-attach to the coracoid process) (23). With the Mumford, which is also sometimes referred to as an acromioplasty, the acromion is shaved down and the biceps head is pulled from the acromion process and reattached to the pec minor tendon (24). Here's a short [YouTube video](#) (via James Chen, MD) discussing the procedure in a bit more detail.



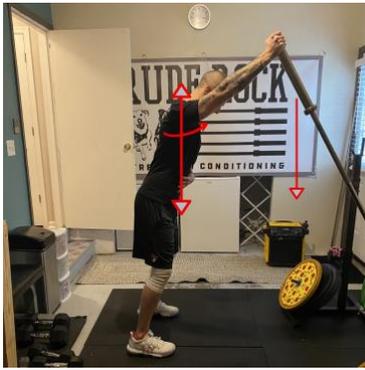


Image 2.5- Using the landmine set-up to demonstrate the "hand rule" which is a good philosophy to follow for athletes coming off labral injury.

Recovery time from a SLAP repair can be brutal, and lengthy. Although the procedure has become much more sophisticated and precise than in past, this still typically requires at least 2-6 weeks being fully immobilized, with an additional 6-12 months to return to relative full strength/ function (23). Depending on where the athlete is in their recovery, you want to always err on the side of caution, again, until the athlete shows you otherwise. A simple rule that we can employ with athletes coming off of labral tears is the “*hand rule*”, which simply means not allowing the athlete to do anything that requires the hand to extend beyond where they cannot see it.

Another point of interest for strength coaches working with SLAP tear recovery is managing compensation patterns. Because of the position and function of the labrum, we should expect quite a bit of compensatory patterns to arise following injury. A way I go about simplifying this is trying to have the least amount of stress on the labrum, while getting as much out of the surrounding structures as I possibly can. I guess this is a roundabout way of saying most of our work for the labrum itself will be indirect. This will often include a lot of carry variations working from different positions, a variety of low intensity band movements, and positional work. Here’s a sample below:

	Carry Variations	Band Variations	Positional Work
Intro	<a href="#">SA Farmers Carry w/ ER</a>	<a href="#">Scap Reach</a>	<a href="#">Elevated Shoulder Taps</a>
First Order Progression	<a href="#">KB SA Rack Carry</a>	<a href="#">Long Lever Supination</a>	<a href="#">Shoulder Taps from Crawl</a>
Second Order Progression	<a href="#">KB BU Waiter Carry</a>	<a href="#">Shoulder Rolls</a>	<a href="#">Chaos Band Hand Walks</a>

Again, as we can see, there isn’t much ‘labrum specific’ work strength coaches can or need to employ. Let the real experts (i.e. Docs/PTs/ATCs) do the legwork on the specific labrum strengthening. By the time they get to us, our time is better served using indirect measures to improve the global strength, stability, and continuity of the joint.

### General Scapular Dysfunction

Somewhat similar to what we outlined with impingement scapular dysfunction is a remarkably broad term that possesses a lot of ambiguity with very little value. Over the years I’ve shied away from using the term dyskinesia specifically, as true presence of scapular dyskinesia is rather uncommon. But just to cover our bases here, as defined by (6), dyskinesia refers to a deviation or maladaptation to the resting/working positions of the scapula. What that means is effectively having a pronounced border of the scapula, albeit prominence of the medial or superior border, as shown in the image below.

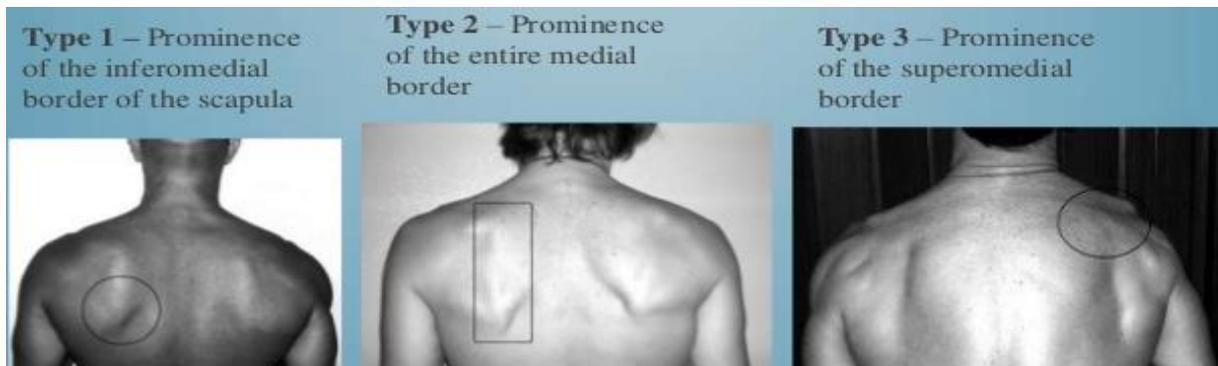
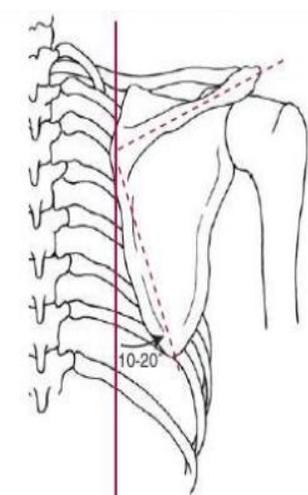


Image 2.6- Examples showing the three main classifications of scapular dyskinesia. (Image via Freedom Physical Therapy)

A healthy functioning scapula should have a wide range of movements, and it honestly doesn't take much to have some or even several movements compromised. For instance, an athlete coming off of a SLAP tear, whose been guarding the area with the upper trap. In this case (type 3 shown above), the upper trap will be overcontributing to scapular movement, which will down regulate the surrounding muscles. A common occurrence in this example is downregulation to the lower trap, and impaired anterior tilt/upward rotation in OH flexion actions.

Another common case in my world is excessive anterior, or kyphotic posture. This is in a sense similar to anterior pelvic tilt, where people get way too myopic on "addressing" it, however, there are true cases where we want to explicitly work to improve kyphosis. When athletes are locked in this kyphotic posture, we have a few common outcomes. In most cases the inner back muscles (i.e. rhomboids, lower traps) are going to be weak, as they have been chronically lengthened over time. We also typically have a similar problem at the lat, because the athlete is fixed in a chronic state of internal rotation and anterior humeral glide, the lat tendon becomes significantly fibrotic, impairing its ability to lengthen appropriately.



- 2 inches from midline b/w 2<sup>nd</sup> and 7<sup>th</sup> rib.
- **Internally rot** -30-45 degrees from coronal plane.
- **Ant tipped** -10-20degrees from frontal plane
- **Upward rotated** - 10-20 degrees from sagittal plane

When we're analyzing scapular dysfunction in a static posture, we want to observe some primary landmarks. Under optimal conditions at rest there are a few key points we can look to. First, we want to see the scapula sitting about 2 inches from the midline, and for most the scapula will run from the spinous process of T2 (superior medial border) down to T7/T9 (inferior medial border) (22). As noted by (7), seeing a difference of >1.5cm or ~5° between left/right scapula could be considered clinical dyskinesia. As for the angles at rest, we want to see somewhere between 30-45° of internal rotation and about

Image 2.7- Animation showing the optimal (theoretical) conditions for resting position of the scapular. (Image via Bengal University Health Sciences)

10-20° of anterior tilt (14). In theory, athletes with a deviated resting scapular position have to work harder (mechanically) to achieve movement. In some cases, this can also be in addition to

incomplete or impaired movement. Because the shoulder (namely GH) will have to work harder, disruptions in scapular positioning should encourage us to pay close attention to the ligaments. Overstressing the area can have consequential effects on the connective tissues.

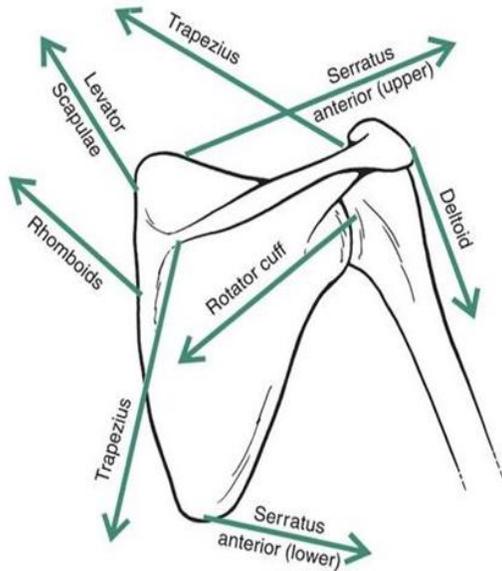


Image 2.8- Illustration of various movements of the scapula and the primary movers for each. (Image via Lippincott Williams & Wilkins)

As for the dynamic positioning of the scapulae, the first thing I'm looking for is the scap: humeral rhythm we outlined in section 1. In my experience, this concerted and coordinated movement between the scapula and the arm itself tends to tell me a lot more about the function of the shoulder, as opposed to analyzing scapular motions independently. I also focus heavily on the surrounding muscular tone. This is a good way to let the athlete simply show you what's been doing the work and can give prominent insight to the muscular balance of the system. We've already addressed this a few times, but again an easy and common example is an athlete with hyperdeveloped lat muscle around the inferior lateral border of the scapula. When this occurs, it can have effects on the resting position (i.e. by constant pulling the scapula away from the midline) or in dynamic actions (i.e. excessive contribution in OH flex).

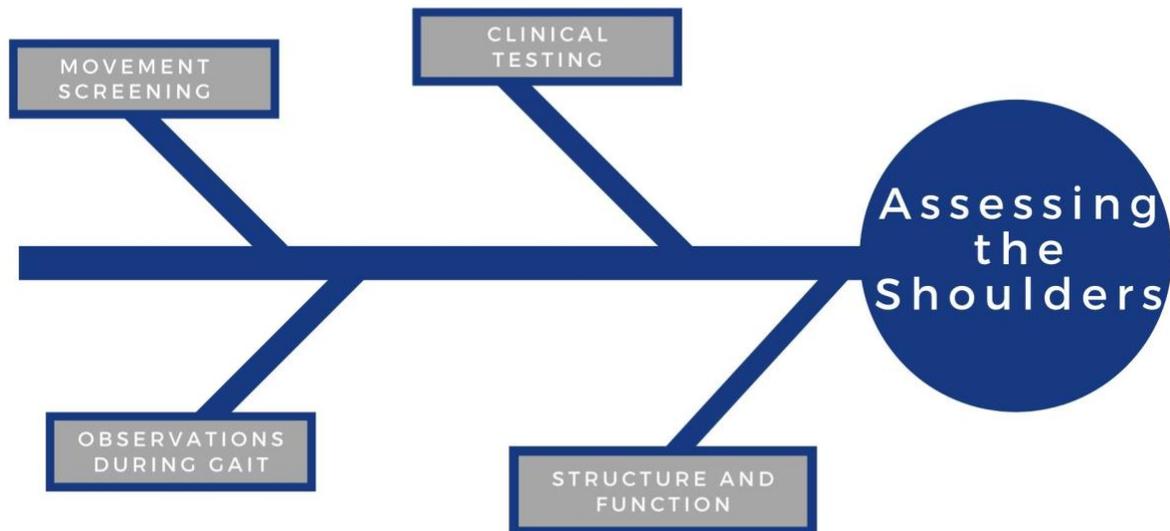
# 3 MAJOR



- 1.) Arthritis, bursitis, and impingement are common irritations that are typically a result of chronic overuse. Each can manifest as more severe injuries if not accounted for.
- 2.) Rotator cuff strains/tears can occur either acutely or (less common) overtime. If torn, surgery is required for return to full health.
- 3.) Labral/SLAP lesions are more commonly sustained over time and present differently across individuals. Several procedures are used to repair.

The overall goal with scapular dysfunction is to identify the prominent variables, and work to improve the relationship with the humerus. If we can correctly identify what's overworking/underworking, and what POM/ROM's are impaired and incomplete, most of our programming should be clear cut. But also bear in mind that much of the work with the scapula will be indirect, and frankly, I find more value in global indirect applications than spending a ton of time on isolated work. But consider both resting and dynamic postures, consider the surrounding structures, and know that habit is a major part of successfully restoring the scapula. Nothing changes overnight.

## SECTION 3



Contribution From: Tim Kelly, BS, CSCS, TSAC-F  
and Jeremy Aspa, MS, LAT, ATC, USAW, CDNLVL1

Assessments have been a contentious talking point amongst coaches, clinicians and academics for decades now. As I've developed throughout my professional career, I've deviated away from fixed models, and relied more so on general concepts. As such, the goal of this section is not to sell you on a specific assessment approach, but rather, identify some of the primary concepts I try to work from when assessing the shoulders of my athletes. Those considerations include:

Broad Considerations for Shoulder Assessment	
Training history/training age	Gait/movement signatures
Injury history	Scapular rhythm
Body reading/body composition	GH stability/ball in socket congruency
Movement screening	Plane specific active/passive ROM
Posture/rib positioning	Progression plan or rate

Regardless of your specific criteria, principles, or practices, we must take the assessment portion with considerable attention to detail. Although I'm stating the obvious here, something that is commonly remiss for coaches is tying their assessment findings directly into training practice. There should be a handful of training subgroupings that we want to examine with particular interest as it relates to assessment findings. In this section, I would like to break down each of the items outlined below and discuss how I go about this process of integrating assessment findings into training practice and application.



### Training History

Every coach knows to inquire about training history, but this should not just be a superficial conversation. It's important to extract as much pertinent detail as the athlete is willing to share, as even the smallest detail can help when writing a program and reflecting on what is needed to drive adaptation. For younger athletes or those with lower training ages it's important to understand what our base objective is. Throwing too many training modes, external stimuli or applications can manifest as suboptimal training. A similar philosophy can/should be adopted for injured athletes as well. When athletes lack extensive training history (short or long term), creating foundational movement principles that emphasize motor control, scapular movement scapular rhythm, and GH ball in socket congruency are what should account for the bulk of our training focus.

### Injury History

**\*DISCLAIMER:** *Athletes with present, diagnosed shoulder pathologies should follow the direct and explicit orders of the physician, physical therapist, and/or medical staff.*

When inquiring about injury history we again want to aim for details. Differentiating between a joint, tendinous, ligamentous, or muscular injury is imperative, as this will govern the restorative approach. For example, if the athlete had a Mumford shoulder repair then we know that they had some type of distal clavicle excision. But if there was any detachment of the labrum or

surrounding muscular attachments, then we should assume that the arthrokinematics of the movements will change. Essentially, the athlete was released of the pain because the structural impingement was removed and potentially any functional detachment was reattached, and we can assume that it will always be tighter and hindered in ROM compared to its original state or the non-injured side. This will be important information when programming exercise and taking into consideration training protocols to progress adaptations without exacerbating shoulder dysfunction and pain.

### **Body Reading/Rib Positioning**

When working with someone who has overhead pain, I put a significant emphasis on body reading. Ideally, I'll have them perform some of our primary movements (i.e. shoulder abduction/flexion or humerus external/internal rotation) and have them do so with no shirt. We want to see how much muscle mass their body has in each muscle group and observe the sequence in which the scapula and humerus move. If they have ribcage stiffness or surrounding musculature tightness (think about lats) then we can assume that cleaning up their thoracic positioning will aid when training the functions of the scapula and GH joint. Also, if the scapula and upper body thoracic musculature is too stiff when going into an overhead movement then often the lumbar spine will compensate to create a position of stability in overhead leverages. So proper core and pelvic function are adjacent when thinking about training the shoulder girdle in our variety of movement patterns.

### **Movement Screening/Special Testing**

There is no shortage of formalized assessments, tools and technologies and principles to subscribe to. Again, I do my best to stay impartial to specific protocols and abstain from relying on anything beyond my abilities as a coach. Sure, those things can all be great when applied correctly, but in my opinion, we should first strive to be proficient with a "*coaches' eye*" before anything else. First, I will manually scour the humerus and traction the joint slightly to see how the capsule takes to passive transitory movements. From there, I'll typically perform some muscular strength testing to see if there is any capsular/ac joint pain involving the cuff.

After the passive movement screening, I like to see how the athletes shoulder flexion/ extension/ adduction/abduction as well as scapular movement look before taking them through any loaded exercises. Essentially, I watch their shoulder blades when doing arm circles/snow angels and specifically look to see the coordination between arm and scapula. Additionally, I always have athletes replicate common stances/ movements found in their sport. For instance, if I have a throwing athlete, I'll take slow motion video of their arm action during throwing to analyze with the athlete. From there, I'll have them do a host of general movements (i.e. inchworms, pushups, inverted rows) and some specific movements (i.e. cuff exercises) for analysis. Remember- the athlete tells us the answers. For full chart summarizing the common specialized tests utilize with my population, please see [Appendix 6](#).

### **Gait/Movement Signatures**

We've already outlined the importance of not becoming myopic with the area or body part in question quite a bit. As it relates to the assessment, assessing the athlete's gait is a critical component to understanding the injury and/or adopted movement signatures. While analyzing gait I'm primarily observing presence of muscular guarding, fluidity between arms/torso function

in sequence with the legs, and if they have specific movement signatures. For example, a pitcher may have glenohumeral internal rotation deficit (GIRD) and slight shoulder drop as well as an awkwardly pronated arm swing when walking. This comes from years of throwing a baseball repeatedly as hard as they can. If they are asymptomatic of pain then, I don't necessarily try to change their movement signature as we are learning now that things like GIRD may be a natural adaptation to learning to absorb the force of repeated throwing efforts. What is more important is the overall function of the shoulder girdle, surrounding muscular development/balance and general movement capacity.

### **Scapular Rhythm**

Scapulae and the surrounding musculature (i.e. lats, low/mid/upper traps, rhomboids, levator scapulae, serratus, and cuff muscles.) need to be trained as balanced as possible. When there is anterior shoulder pain more often than not it is simply due to weakness and poor motor control regarding these posterior muscle groups. As outlined in the previous section, we optimally want to see a 2:1 ratio between GH:scap movement. What we will commonly see is delayed scapular movement with humeral action, which is a good indicator that there is motor control and/or neuromuscular deficiencies. In this case, delayed scapular action typically results in putting excessive stress on the GH joint and the surrounding connective structures which can present as pain in a variety of ways. Another important distinction with scap: humeral rhythm is analyzing both the arm flexion and extension patterns. There can be cases where the scapular motion looks perfect during flexion but be irregular or disrupted during arm extension.

### **GH Stability/Ball in socket congruency**

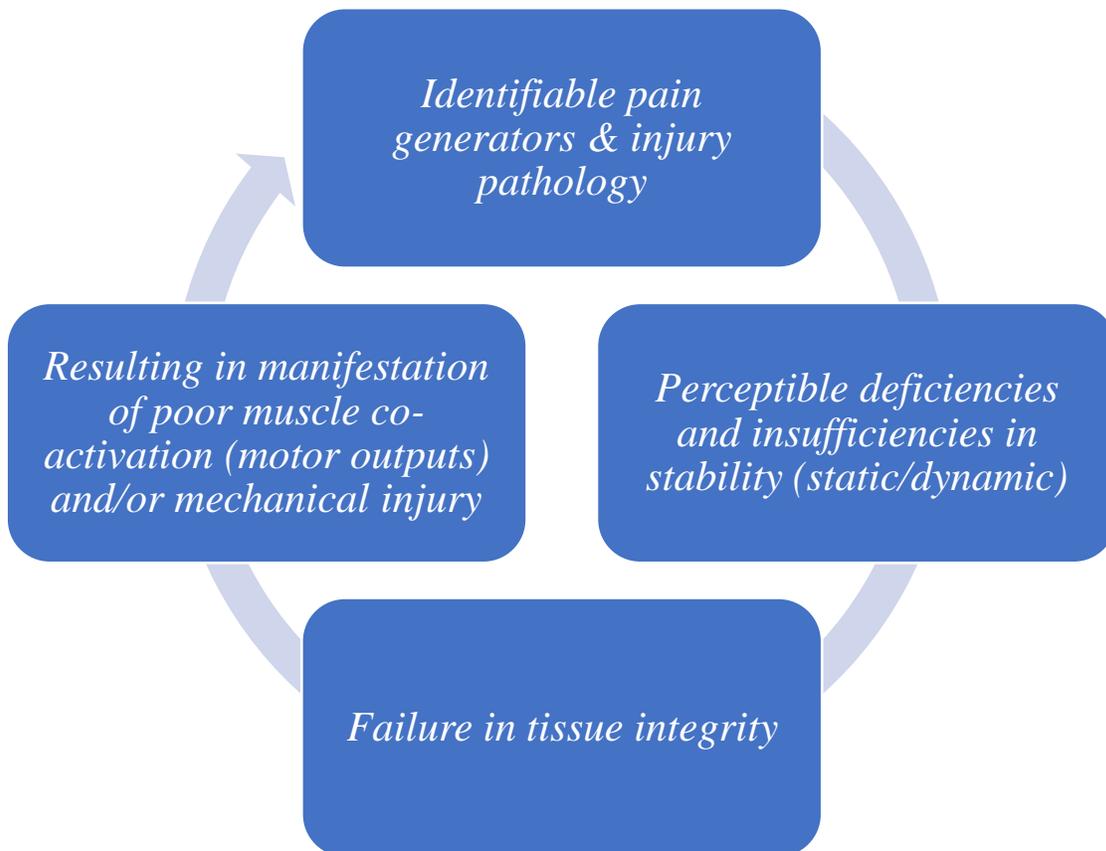
This is probably the most important factor to assess when analyzing at the quality and capacity of shoulder movement patterns. One of the primary assessments I rely on to check this is a passive scouring ROM test on the table. Of course, every athlete/shoulder is unique in its own right but generally speaking, while performing this scouring we should be able to achieve a full ROM with no presence of sticking/catching or clicking. Recalling that the GH is a true ball & socket joint, full rotary movement *should be* attainable without issue. Similarly, it's important to look at the rotational nature of the humerus and how this could be influenced by neighboring joints such as the cervical spine and/or the wrist. Identifying the degree of abduction/adduction the athlete uses to achieve OH flexion patterns is often telling for proficiency with humeral rotations. Athletes who rely on compensations such as aberrant neck movement or wrist deviation as they go into flexion often have lingering or underlying mechanical limitations at the shoulder.

### **Plane Specificity/Progression Plan**

As we move beyond the assessment period and begin to tap into the training side of things, I've found the most success by introducing movements that possess low amounts of gravitational forces and strict uniplanar motions. It's also important to categorize the parameters, low level forces first then static strength then transitioning to multiplanar stability and finishing with dynamic capacity. Essentially, working from the wall to the ground as well as working from CARs to static strength to transitioning into more complex positions and ending with reactive drills are the best approach. There should always be a framework prior to training initiation, although we always recognize this framework can be ratified and/or adjusted in either a progressive or regressive manner at any point.

## Considerations for Overhead Athletes

The demands of the shoulder complex increase when considering the overhead athlete. Overhead tasks performed at high velocities increase the demand for dynamic strength and stabilization at the same time all while accepting violent contractions. Going back to ball and socket congruency, it's good to know the tendencies of the ball and socket when performing this acquired skill. Allowing for the athlete to exhibit efficiency and optimal functioning of the stretch reflexes and stretch shortening cycles may be an effective indicator of the currency and effectiveness of your rehab process. As shown in the chart below, which was adopted from (4), there is always a cascade of outcomes when injuries are present. As for overhead athletes, this cascade can often be accelerated as there are numerous compounding demands and constraints placed on the athlete. What's more, is that the controlled aspect of strength training is only a fraction of the puzzle. Criteria such as pitch/throw count, practice intensities and volume, and point in the sport calendar can all complicate the process to restoring strength and function.



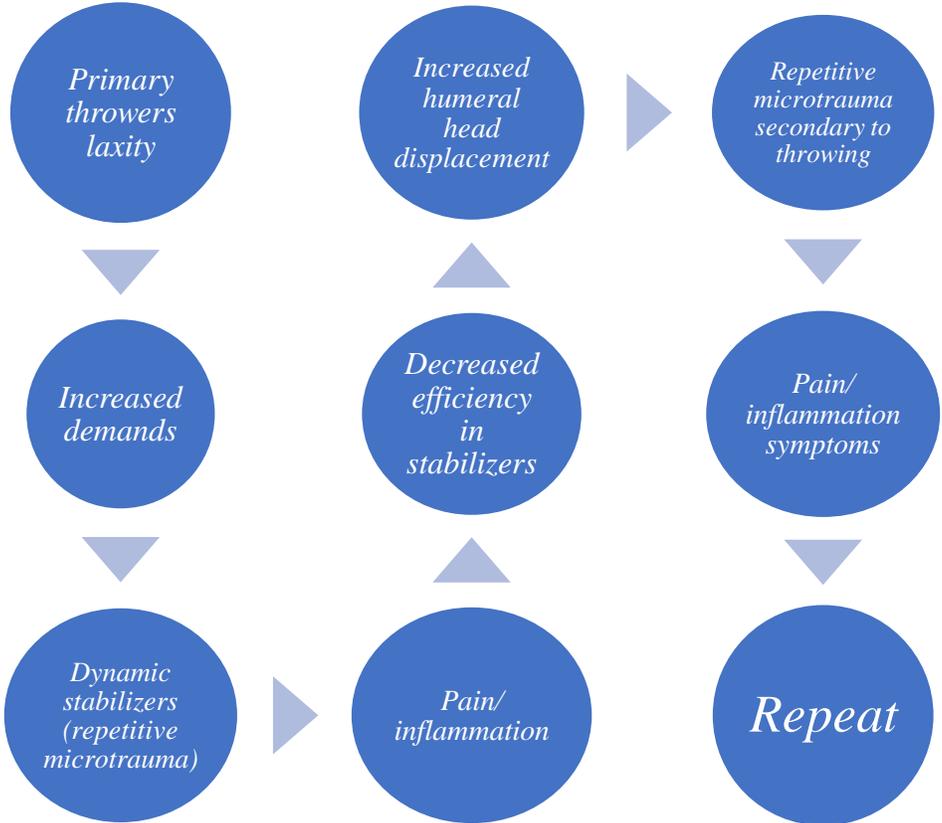
**Note:** Information provided in flowchart courtesy of (4)

Additionally, we can utilize the actions of the athlete's sport as quintessential assessment tools. The easiest example of this is analyzing the throwing action in baseball. It has been identified by (26) among others that possible underlying pathologies can be associated with specific components of arm action:

Throwing Phase	Possible Outcomes
Pain on follow through	Possible rotator cuff pathology
Pain in cock position	Instability or impingement
Pain in deceleration	SLAP lesion, biceps tendon pathology
Loss of control and/or velocity	Proportional to the severity of the present condition. Loss of control associated with early ball release or acceleration is suggestive of internal impingement. Complaints of loss of velocity are associated with a limitation in internal rotation
Non-specific general pain	Possible labral tear

**MICRO TRAUMATIC REPETITIVE STRESS CYCLE**

While the flowchart above is referencing overhead athletes specifically, the micro traumatic repetitive stress cycle (shown below) is more all-encompassing. Overhead athlete or otherwise, pain and injury manifestation tend to become cyclical in nature when training is not monitored and/or ratified appropriately. There is a lot to be covered from the chart below, but the primary thing that jumps out to me is the delicacy of the return to play conundrum. Or, in other words, how each independent variable can influence the collective whole. It's important that we remain unbiased in our practice and methods, as becoming overly committed to one aspect, or even worse, failing to address items entirely can have sweeping consequences. **Note:** Info provided in chart below is courtesy of reference (26).



# 3 MAJOR

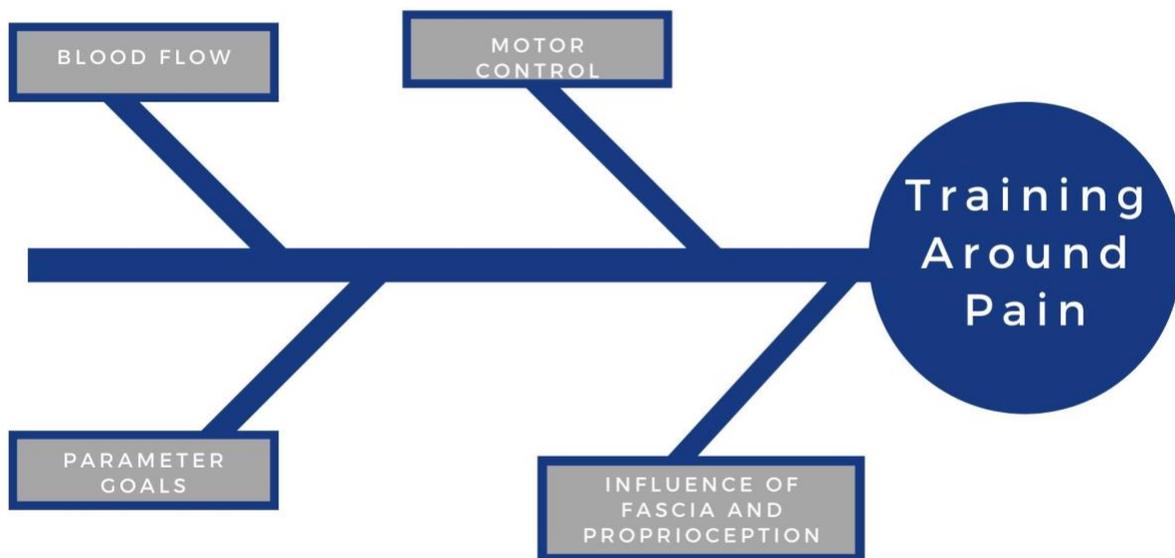


1.) Scapulohumeral rhythm is a primary indicator of general shoulder health and function. Ideally we want to see 2:1 GH:Scap. movement.

2.) Assessments for S&C should be developed from prior medical diagnoses and concentrated on present movement diagnosis. Our goal is to improve what's deficient without compromising strengths.

3.) The microtrauma repetitive stress cycle illustrates the delicate nature to restoring strength and function. A sharp reminder to the importance of independent variables.

## SECTION 4



Contribution From: Tim Kelly, BS, CSCS, TSAC-F  
and Jeremy Aspa, MS, LAT, ATC, USAW, CDNLVLI

Whether you're a D1 athlete, a recreational gym enthusiast, or a washed-up athlete trying to stay sharp like myself, nothing will detract your training cycle like the presence of pain. Make no mistake about it, pain manifestation itself is a highly complex and even controversial discussion. But if we put the technicalities to the side for a minute, the goal remains simple- mitigate the presence of pain so that I can train safely and effectively.

As we discussed in section 2, there are several common injuries/dysfunctions at the shoulder that have sweeping consequences. Even less severe ailments such as impingement or bursitis can become very difficult to manage. In this section, I would like to detail how I go about navigating pain with my athletes. Please bear in mind that this isn't a definitive guideline as to how to bypass pain for specific injuries, but rather, some secondary measures we can take to improve the area while subsequently reducing the pain levels.

It's important to recognize that a great deal of pain management simply has to do with proprioception. Proprioceptors, which act as the protective governors of the human body, are heavily involved with fluid dynamics and nervous system perception as well. Here is how I categorize my variables when having to train a client with shoulder pain.

<b>Broad Parameters of Training Around Pain</b>	
Blood flow/movement prep	Pre-fatigue/pre-hab
Motor control (secondary stabilizers)	Parameter goals (i.e. ROM/strength/stability)
Proprioception (perturbative stability)	ROM- active and passive
Hand position (training weaknesses)	Dynamic function (i.e. eccentric/iso/reactive)

### **Blood Flow-Movement Prep**

Most pain is due to proprioception or the nervous systems perception. A great way to avoid this is by simply increasing blood flow to the local musculature that will be trained. Whether it be with a pre fatigue type of movement prep, simple calisthenic arm circle type of movement prep or doing something more advanced like a BFR upper body circuit, anything that increases blood flow to the shoulder capsule and the surrounding larger musculature is a surefire way to manage pain when training.

### **Perturbative Stability-Motor Control in Primary Movements**

Before getting into the primary movements for the day, it is important to increase motor control and secondary stabilizers in said movement. For example, if I was doing 4x6 at 75% on my bench press, before I got to my work weight, I may do a Chaos bench press or have my partner do some manual perturbative work while warming up with the bar. The increase TUT and intent driven focus will help to increase motor control when focusing on bar path in the working sets, it also increases blood flow and motor recruitment to secondary stabilizers like the rotator cuff muscles or any of the posterior chain muscle involved in the eccentric of the bench press.

### **Hand Position- Avoiding motor dysfunction and mechanical incongruency**

If we have an athlete with anterior shoulder pain, then I am likely to avoid a straight bar bench press. It is common knowledge to have the athlete use a neutral grip swiss bar or DBs to change the hand position and the subsequent arthro/osteokinematics at the shoulder during the primary pressing work. What is not addressed usually is hand position in secondary accessory movements

such as supination on triceps exercises or doing manually overload scap work with the three different hand positions in a transitory nature. Simple things such as changing hand position on accessories can give the athlete the necessary motor control and musculature balance to keep GH stability and ball in socket congruency when doing more dynamic/demanding movement tasks.

**Parameter Goals**

Depending on what the athlete’s needs are we can still train around pain by culling the most important variable. For example, if we wanted to get some overload on the bench press, I would much rather use a bench block or pins to cut the ROM and then increase the length of the eccentric movement to train both motor control and the necessary fiber/tissue adaptations. However, if I wanted to work on ball in socket congruency and ROM when in deep shoulder flexion like a Dip then I would like to assist their bodyweight with a band, or maybe regress to a deficit eccentric/isometric pushup to focus on scapular control position as well as GH centration when in the end ROM.

	<i>Joint/Axial Strength</i>	<i>Muscle Tissue Hypertrophy</i>	<i>Connective Tissue/Fascia Speed/Power</i>	<i>Combined Localized Energy System</i>
<b>Plasticity</b>	Low	Medium	High	Low
<b>Elasticity</b>	Low	Low	High	Medium
<b>Viscosity</b>	Medium	Medium	Low	Medium
<b>Remodeling</b>	High	High	Medium	Low
<b>Motor Control Positioning Arthro vs Osteo Kinematics</b>	Slow/Static	Facilitates or Inhibits	Reactive	Adjacent

**Pre-Fatigue/Prehab- Chaos/Perturbative/Scap/GH Stability Centric**

The idea is to fatigue the larger muscle groups in a global compound exercise to both bring blood flow as well as force the secondary fibers to contribute when going to a non-traditional primary movement such as offset loading or chaotic/perturbative strength focus. Essentially, we would like to bypass the larger muscle groups function to more directly focus on smaller less trained muscle groups in the individual to help drive the specific adaptation. Most people lack serratus anterior strength which causes their scapula function to be less than optimal for shoulder health, so emphasizing regular pushups or DB bench press in a movement prep then focusing only on scapular protraction for the highest intensity and shorter ROM during the primary working sets is an example of using this idea to train around pain.

**ROM/Mobility- Active vs Passive? Position Specific**

Essentially, we want to have a nice mix of tissue quality as well as active motor control to enforce position specific stability. So it may be pertinent for the athlete to have a specific soft tissue and FRC style ROM set of exercises prescribed to them to pair with their primary/foundational strength movements. It is important as well to have good sequencing of relaxation of muscle groups when doing dynamic movements, so pairing specific contract relax drills such as a pec wall stretch with a band pull apart may help the athlete feel the necessary

agonist/antagonist kinetic sequencing when throwing an object to avoid that shoulder pain that comes from poor GH centration during the movement.

### **Dynamic Function**

Once adequate musculature balance and pristine motor control of both the thoracic spine/scapula/humerus are present then we can strive for dynamic training stimuluses to try and build resiliency. Doing puncher plyometrics and reactive band work are a good end goal when training a post rehab shoulder injured athlete. For some it may be as little as 6-12 weeks and others may be as long as 1 to 3 years to reach the said goal. The important part is to know your principles, and to adjust your methodologies to best suit exactly what you are seeing in real time with your athlete's shoulder function. **Video:** [Exercise Progression Level 1-3](#)

# MY SHOULDER HURTS, WHAT DO I DO?



## 1. Do Not Stop Training

- We understand that everyone's injury is different therefore needs will vary
- Sure, if you stop training completely your shoulder may stop hurting...
- BUT you do not want to run the risk of losing function to perform activities of daily living, high performance tasks, and deconditioning the shoulder complex
- Think of movement being a "fountain of youth"
- We're ultimately finding ways to substitute painful movement to chase our desired adaptations



## 2. Identify/Understand Your Limitations & Pain Generators

- Strength
  - You may be strong at certain ranges of a movement (i.e. stronger at the top of a bench press)
- Range of Motion (ROM)
  - You may be able to perform a movement however with limited ROM
- Dynamic
  - Moving fast may cause pain
- Static
  - Do you have chronic pain even at rest?



### 3. Adjust Training Modes to Train Around Your Pain

- Blood flow/ Movement Prep
  - Take your time performing dynamic warmups to prime your body to move
  - Pre-potentiate weak muscle groups to allow prehab strengthening as well as increased blood flow
- Proprioception/Perturbations
  - Utilize low weighted unstable chaos training or manual perturbations to train joint stability at different ranges of motion
- Hand Positioning
  - Consider changing hand positioning to decrease pain or unwanted pressure on the shoulder
- Prehab/Rehab/Blood Flow Restriction
  - Consider utilizing rehabilitative exercises as a single joint warmup to prepare for dynamic warmups
  - Consider blood flow restriction training to utilize very light weights to acquire maximal muscle training benefits
- Restore Dynamic Function
  - Ensure your efforts align with restoring dynamic function overtime
- ↑ Goals



### 4. Commit to a Rehabilitation Program

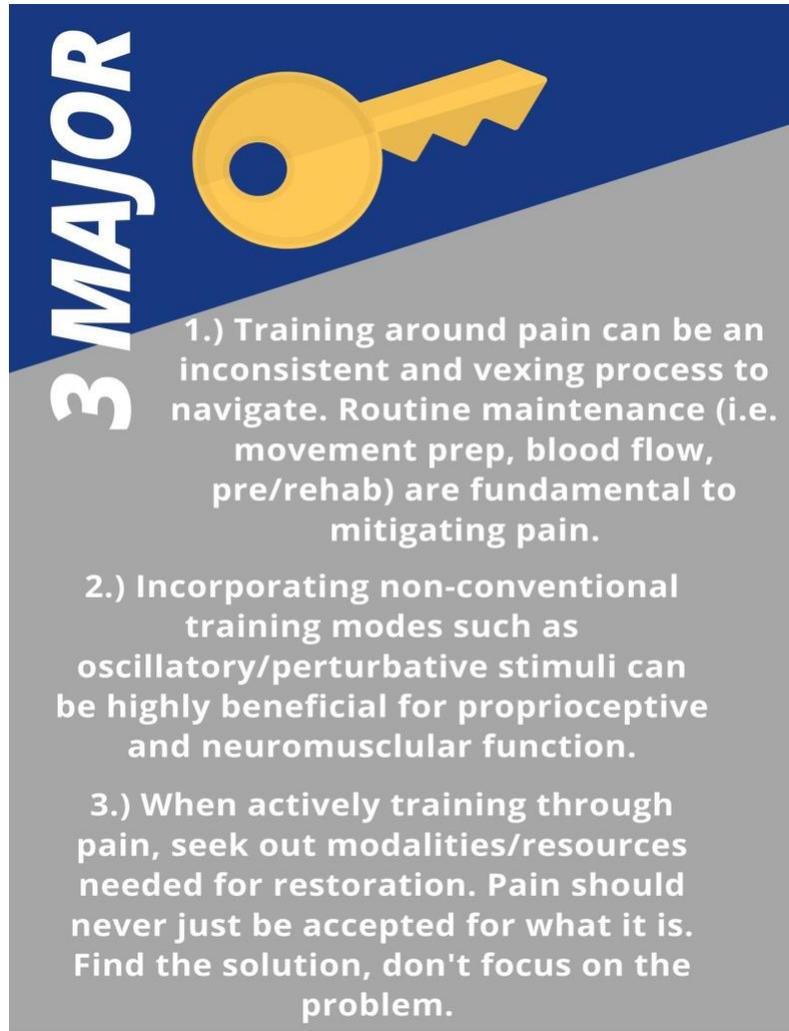
- Restore Motor Control
- ↑ Proprioceptive Abilities
- Work to ↑ Training Parameters
- ↓ Pain
- Restore Proper Function
  - Most important consideration is not only becoming symptom free, but to address the mechanical dysfunctions
  - Dedicate a separate time outside your workout to focus primarily on rehab. This allows for more round the clock care



### 5. Seek Medical Intervention If Needed

- If conservative measures are not increasing or failing, seek a sports medicine orthopedist or other healthcare professional that specializes in sports medicine, physical medicine & rehabilitation, and/or performance orthopedics

- Perhaps diagnostic imaging, medicinal, physical medicine, formal physical therapies, or surgical interventions may be considered

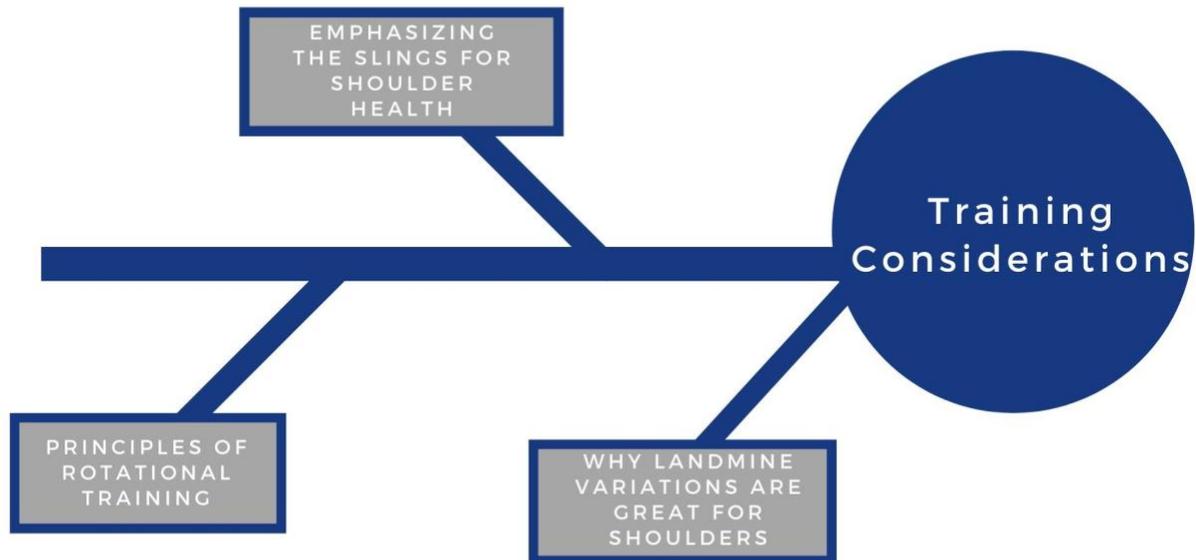


**3 MAJOR**



- 1.) Training around pain can be an inconsistent and vexing process to navigate. Routine maintenance (i.e. movement prep, blood flow, pre/rehab) are fundamental to mitigating pain.
- 2.) Incorporating non-conventional training modes such as oscillatory/perturbative stimuli can be highly beneficial for proprioceptive and neuromuscular function.
- 3.) When actively training through pain, seek out modalities/resources needed for restoration. Pain should never just be accepted for what it is. Find the solution, don't focus on the problem.

## SECTION 5



Contribution From: Danny Foley, MS, CSCS\*D and  
Tim Kelly, BS, CSCS, TSAC-F

## 5.1- FASCIA SLINGS FOR SHOULDER HEALTH

**Author:** Danny Foley

We've talked at length about restoring the shoulders after an injury has already occurred, but I don't want to overlook the importance of preventative measures and general maintenance. In this section I'd like to shift the focus more on the routine "upkeep" side of things, as this is something that should be a point of focus for all athletes. Over the last three years, I've worked with hundreds of athletes who've had SLAP or cuff tears, arthritic shoulders, and shoulders that just don't move well. While it's been a vexing problem to solve at times, it's also forced me to find solutions when common methodologies fall short- *and they often do*. As we've reiterated throughout this handbook, a lot of preventative measures for shoulder health is emphasizing the structures surrounding the joint itself. Chief among them, in my opinion, is putting a premium on the [fascia slings](#).



anterior oblique sling

posterior oblique sling

Image 5.1- Animation highlighting the anterior and posterior fascia slings. (Image via The Prehab Guys)

There are two prominent fascial chains enveloping the torso- the anterior and posterior slings. As illustrated to the left, the anterior sling includes the pec/serratus and contralateral oblique/adductor, whereas the posterior sling includes the lat and contralateral glute (18). The slings are predominantly responsible for maintaining resting and working postures, transferring and dispersing forces from lower-to-upper extremities, and proprioceptive facilitation (18). Fascial tissue is composed of mostly collagen and water and acts mostly under the laws of fluid dynamics (16). As such, lack of movement- among several other factors, reduces the amount of hyaluronic acid circulation which then causes the tissues to become more adhesive (16).

Tissue adhesion is what often causes the sensation of "tightness" or "stiffness", which can at times be disruptive enough to impair fundamental movements. Fascia has three main properties- plasticity, elasticity, and viscosity. These properties can be disrupted in numerous ways, as there are a host of variables at play. Assessing and managing these fascia properties in the surrounding and localized structures is an imperative step in managing the health & function of the shoulders.

Property	Description	Training Application
<b>Elasticity</b>	Ability to store and release kinetic energy	-Catapulting, rebounding (forefoot running) -Ballistic stretching under load -Oscillatory & perturbative loading
<b>Plasticity</b>	Ability for tissue to reshape and reform (elasticity + viscosity)	-Deep, long isolated stretches under load -Soft tissue modalities
<b>Viscosity</b>	Ability for tissues to glide smoothly across one another	-Hi plyometric/impact forces -Oscillatory/ballistic stretching -Submaximal global movement patterns

**NOTE: Information in chart provided via (16)**

### Primary Functions of Slings



*Image 5.3- Beautiful example showing the enormous power capabilities of fascial tissue. (Image via Titans Volleyball-YouTube)*

The slings are prominent factors in providing stability and structure to the shoulder girdle. The diagonal and helical orientation of the slings should illustrate their significant contributions to contralateral based movement; to include everything from mundane tasks such as walking to complex dynamics such as the image shown to the left. The function and responsibilities of the fascial slings really is quite vast. When we're analyzing structure and postural support, the main properties we're considering are plasticity and viscosity. The tissues resting length, or tautness, will largely govern the ability to

produce full ranges of motion. When the fascia becomes restricted, the muscles do too. In a sense, the fascia can engulf or entrap groupings of muscles, which can modify or compromise their ability to fire fully or correctly and ultimately mitigate force output (16).

*“Stretch away the elasticity of fascia, all you're left with is muscle.”*

*~Stu McGill~*

Along with providing support, the slings are also responsible for permitting movement and producing/managing force in a multitude of directions. Proficient (and efficient) force transfer is absolutely critical for sport and even everyday function to some extent. The main property at play here is the elasticity of the tissue. When the fascia loses its elastic properties, the tissue is losing its efficiency or capacity to manage, transfer, and express force (18). A secondary consequence of this is now the muscles have to work harder for less result. As highlighted by the quote from Stu McGill, muscles aren't nearly as effective force transmitters as fascia. When the fascia isn't

functioning optimally, it puts excess strain on the contractile properties of the muscle. What this all boils down to is the more the musculature/connective tissues surrounding the shoulder are forced to work for themselves, the less effective the joint is as a collective unit. Along with compromising performance, this can make the shoulder more susceptible to damage as well.

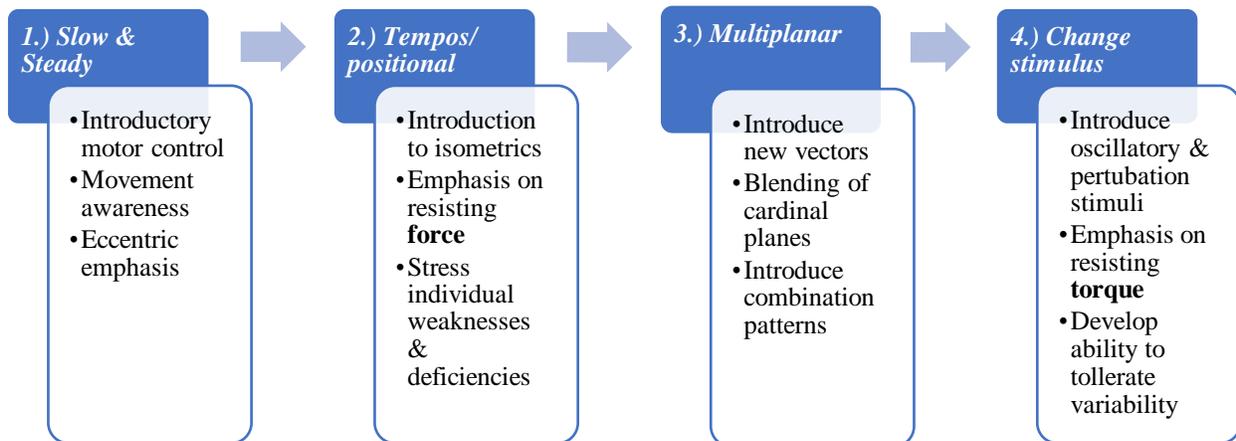
### Introducing Sling Patterns

Contrary to what most assume, putting an emphasis on the fascial slings does not require some bizarre, complete shift of training principles. In fact, most of what I use to emphasize the slings is quite unspectacular. The root of these movements are all common items we see in just about any training program- crawls, carries, bridge patterns, etc. I suppose the only real difference is the ways in which I go about modifying or progressing these. As always, we want to establish proficiency with the basic variations first, but from what I've observed over the years there is significant value in using a wide spectrum of variations. Take a look at the chart below.

Movement	Progression 1	Progression 2	Progression 3
Carries	<a href="#">KB Hi-Low</a>	<a href="#">DB Uneven OH</a>	<a href="#">DB OH Carry w/ Mini</a>
Deadbugs	<a href="#">MB Compress</a>	<a href="#">Band Offset</a>	<a href="#">DB Anti-Rotation</a>
Birddogs	<a href="#">Birddog w/ Abduct</a>	<a href="#">Band Offset</a>	<a href="#">LM Anti-Rotation</a>
Bridge	<a href="#">SL Glute w/ Flex</a>	<a href="#">Band Offset</a>	<a href="#">SL Long-Lever w/ Pullover</a>
Crawl Patterns	<a href="#">4-Way Crawl</a>	<a href="#">Band Offset</a>	<a href="#">Hover w/ SA Compress</a>

You should notice some common themes applied- multidirectional, adding an offset vector, changing the stimulus. Again, we're not doing anything outside of the box here, we're just taking foundational movement patterns and adding layers to them to elucidate the slings. The whole premise is to find new ways to challenge the same things, the way I think about it is trying to **improve the athlete's ability to tolerate variability**. In doing so, we will provide the athlete with a more robust, durable pillar to work from, which in turn will give the shoulders a better and broader and more reliable platform to work off of.

The rate and frequency at which you progress or interchange these movements is entirely based on the athlete's ability to demonstrate proficiency. No differently than anything else, if the athlete cannot execute a solid standard deadbug pattern, we obviously shouldn't progress the movement. Another consideration, which can sometimes be used as intermediate progressions is to play with the tempos and breath cadences of the movements. For instance, in lieu of going from a standard birddog to the hover variation outlined above, maybe we spend a couple weeks working on eccentric/isometric hold patterns. From there, we can combine the tempo with a coordinated breath sequence (i.e. forceful exhale on extension). Progressing movement doesn't always indicate "more" or "harder", sometimes, it's just emphasizing weak links in different ways.



### Rotation/Anti-Rotation

I believe that establishing proficiency with contralateral-based movements is a requisite precursor to rotational movements. I put a tremendous emphasis on utilizing a lot of contralateral and unilateral movement in my programming. This is of course relative to the athlete, but I will use anything from basic crawl patterns for motor control and functional coordination to a [BB Overhead March](#) for complex dynamic reflexive stability. Takeaway point- use a good amount of contralateral/unilateral exercises in your training and use them as a means to build into proficient

rotational patterns. The primary observation I have with the slings in rotational movements is how in sync the upper and lower extremities are. If the athlete has a difficult time coordinating this synchronicity between upper and lower, force production will always be compromised. And when force production/transfer is inefficient, the joint will again be subjected to undue stress. Check out this [video for more detail](#).

Rotational patterns inextricably demand coordination between upper and lower extremities. As such, we want to consider how to modify and manipulate movement patterns to accommodate this ability. Using simple adjustments like changing the angle, the lever, stance, and speed can have tremendous benefits for the slings and rotational proficiency. But again, the goal is to orient the movement/athlete to facilitate coordination between the upper and lower extremities.

Rotation	Progression 1	Progression 2	Progression 3
Intro	<a href="#">Band 1/2 Kneel Chop (Hi-Low)</a>	<a href="#">Cable Long Lever</a>	<a href="#">LM SL Hinge to Bend</a>
Moderate	<a href="#">Band Chop from Split (Low-Hi)</a>	<a href="#">Cable w/ Band Distract</a>	<a href="#">LM Lunge-to-Punch</a>
Advanced	<a href="#">Band LL Chop from Split</a>	<a href="#">MB Low-Hi Reactive</a>	<a href="#">LM Dynamic Rotation</a>

Although for some bizarre reason “anti-movement” has been under siege lately, there are many coaches including myself who would argue this is actually the more important function of the slings and/or torso. There’s no shortage of examples throughout any sport the demand for resisting forces/movement. But the ability to resist external forces and/or movement is reliant upon the athlete’s ability to create synchronized stiffness and rigidity; and in most cases, in a very brief amount of time.

Ant-Rotation	Progression 1	Progression 2	Progression 3
Intro	<a href="#">½ Kneel Band Palloff</a>	<a href="#">MB ½ Kneel Lift Off</a>	<a href="#">Manual from Split</a>
Moderate	<a href="#">Band Palloff w/ Raise</a>	<a href="#">MB Drop from Split</a>	<a href="#">Inertia Wave</a>
Advanced	<a href="#">Dynamic Palloff</a>	<a href="#">MB Sling Side Plank</a>	<a href="#">Jammer Throw</a>

I like to think of the slings as *brackets* when working [anti or resistive movements](#). I’ll cue this by instructing the athlete to “pin their shoulders to the hips” with an emphasis on creating cross-body tension. When we’re training anti-based movements, it’s also important we are keen on reinforcing proper (or sport-specific) posture/position.

### Scap Function

Both the anterior and posterior slings include prominent musculature in regard to scapular function. For the anterior slings, the serratus anterior is a critical muscle of the scapula, acting as the prime mover for protraction and assisting in upward rotation and anterior tilt. As for the posterior sling, although the lat doesn’t have a direct scapular attachment in most individuals, even indirectly the lat muscle has major contributions to scapular function. Most significantly, is the role in facilitating and stabilizing overhead flexion.

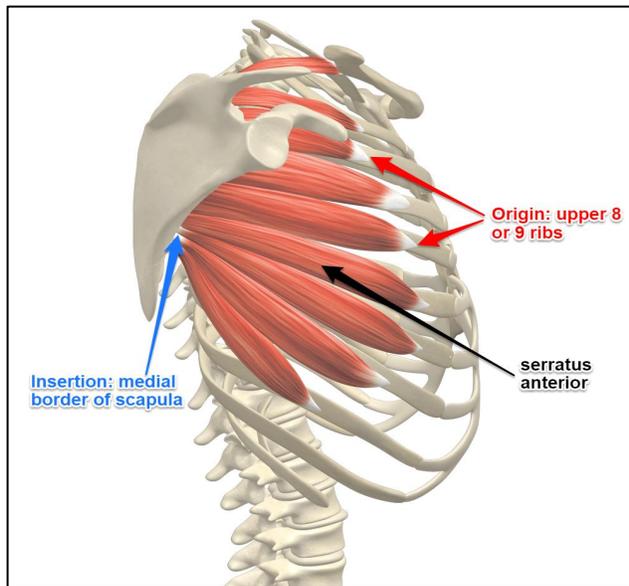


Image 5. 4- Illustration showing the anatomy of the serratus anterior. (Image via yogaanatomy.com)

The serratus muscle especially is typically an overlooked item in exercise programming. When the serratus is underdeveloped, the scapular motion will be incomplete, which typically results in something else picking up the slack. However, what I feel is even more important with regard to the serratus is the direct fascial connection it has with the oblique, lat, and abdominal muscles. What this tells me is that if we have either chronically tight, or chronically weak serratus muscles, we will likely see compromised core muscles as well. We've all seen the athletes who struggle overhead due to weak or inefficient core position. While identifying the lack of anterior stiffness is relatively easy to observe, we should also be cognizant of how this may be impacting scapular function.

The lat muscle, which is the largest in the upper body and has wide spectrum of responsibilities is another one that can get overlooked in programming/exercise selection. With my population, one of the main observations I see is lats that are overly stiff, particularly at the proximal end. The common associations for lat stiffness are the rounded upper back/shoulders with hands internally rotated (or, kyphotic posture). When the lats are chronically stiff, overhead flexion patterns will be impaired and often compromised in strength. However, there's an additional point to consider which is the effects on the lumbo-thoracic region. When the lat is lacking in extensibility, we must be aware that this often effects both attachments sites. Meaning, lat stiffness can be a culprit for pulling athletes into excessive lordotic extension. The takeaway point being, lat stiffness can disrupt a lot of movement patterns, and should be addressed when present.

### Oscillatory and Perturbative

The last item I wanted to touch on are oscillatory and perturbative applications, which are commonly referred to as "chaos" or "water bucket" set-ups. I know, these are very easy for pundits to poke holes on (aka the *old school* crowd) but I promise you this isn't for show or gimmick. The main purpose with these applications is emphasizing the neural and proprioceptive elements. I think about the nervous system like a river- **where the depth of the river is the neural fatigue resistance, the width of the river is the ability to tolerate variability, and the current is the speed of contraction.** All of which, obviously, have great ramifications in function and performance. Oscillatory and perturbative movements are excellent options to help with these traits. Using the metaphor of the river, these variations are specifically emphasizing the width of the river- or the ability to tolerate variability. It's important that the athlete is able to stabilize and demonstrate motor control under unfamiliar circumstances, as very little in sport is preplanned or anticipatory. As such, this is a subtle way to force the athlete to create different movement solutions for the unpredictable nature of the stimulus. Below is a chart of some of the more common variations I use with my athletes:

Oscillatory/Perturbative	Progression 1	Progression 2	Progression 3
<b>Intro</b>	<a href="#">BB/WB Zercher Carry</a>	<a href="#">Arm Perturbations</a>	<a href="#">Chaos Serratus Push-Up</a>
<b>Moderate</b>	<a href="#">PVC Offset Carry</a>	<a href="#">Stability Push-Up</a>	<a href="#">Chaos Push-Up Walks</a>
<b>Advanced</b>	<a href="#">BB OH Waterbucket</a>	<a href="#">Band Rebound Chop</a>	<a href="#">Heavy Band Side Plank</a>

As I've continued to learn over the years from individuals such as Cressey, Tim, Jeremy, and several others who are far more adept with shoulder rehab than I am- **everything starts with building a solid foundation to work from.** It can't be overstated enough that the weaker the supporting cast is (i.e. anterior core, slings, stabilizing connective tissue, posterior chain) the harder the shoulder joint has to work for itself. And the harder the shoulder joint has to work for itself, the more constrained we become in movement capacity and limited in force production capabilities. I feel that the slings are paramount to optimizing performance and maintaining proper health, balance and function. Given the complexity at the shoulder, we can quickly get lost in our training applications, irrespective of whether or not pain is present. From my experience, improving the function of the slings, the stability of the torso, and strength of the surrounding muscles are all prominent variables for shoulder function. Adding in some more sling specific work for your shoulder maintenance is low hanging fruit and can be highly beneficial in the long run.

## 5.2- WHY THE LANDMINE IS THE ULTIMATE SHOULDER TOOL

**Author:** Danny Foley

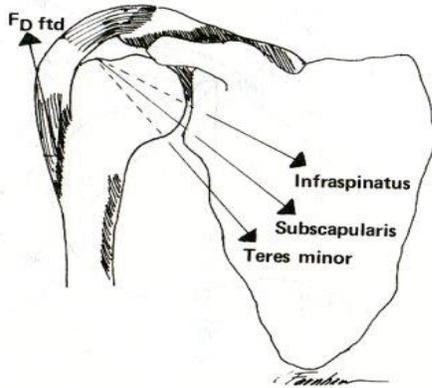


Image 5.5- Animation highlighting the contrasting force vectors occurring during dynamic stabilization of the GH joint. (Image via Jason Cholewa)

I've heard over the years that "with great mobility comes great responsibility." Considering there is no joint in the body with more freedom of movement than the shoulder complex, it should be appreciated by the coach that we're likely going to have to work deliberately on strengthening and stabilizing the area- and in several planes of motion. Mobility and stability, contrary to popular belief, are not mutually exclusive. Very simply, if the joint has a mobility function, it needs stability to compliment the system. The same being the case for joints that are predominantly stabilizers, they need to be mobilized in some capacity in order for the joint to function optimally.

There is no empirical ratio between mobility and stability. The outcome will always be dependent on the joint in question, the abilities the athlete presents, and the demands of their sport. Concepts like the joint-by-joint approach, which has been popularized by Mike Boyle among others, is a terrific starting point. I don't disagree with this way of perceiving joint actions, however, we have to recognize that there is much more to it than simply exclusively mobilizing certain joints and exclusively using stability exercises with others. Unfortunately, it just isn't that simple.

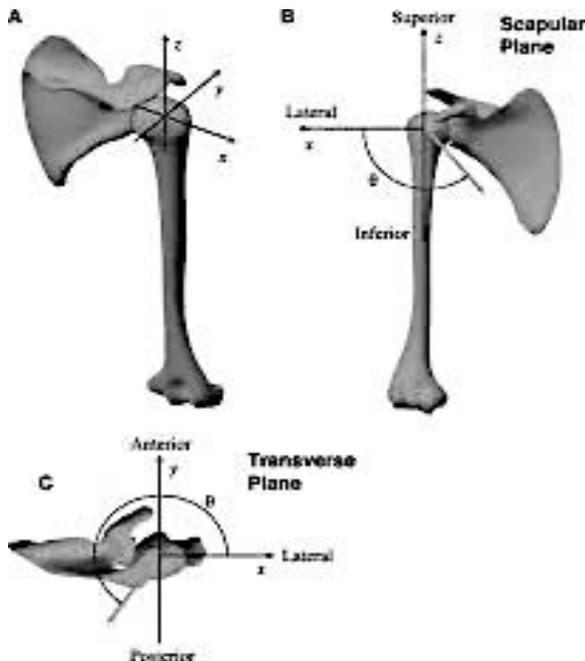


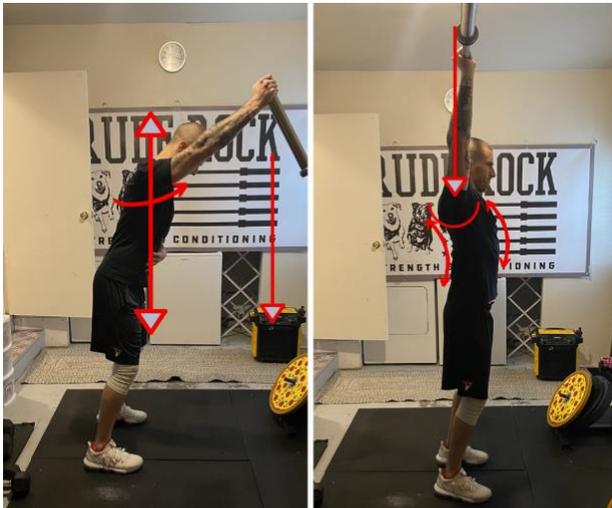
Image 5.6- Animation from (2) illustrating the omnidirectional freedom of the shoulder.

In addition to the unique demands placed on mobility and stability of the joint, the landmine also gives us a more natural position to work from with significantly less constraint. Recall back to the opening section of this handbook where we discussed the importance of considering the structures surrounding and supporting the shoulder joint itself. I think the landmine gives a tremendous advantage for total body inclusion on various movements. What most perceive to be "cheating" the lift by using lower body or surrounding muscles, I consider to be **functional**. Yes, we should have some select exercises that are more isolated or joint specific in nature, but I find less and less value in that as the athlete returns to full health and function. Unless you're a body builder, isolated, strict movements are of very little value in the eyes of transference.

## Setting Your Athletes Up for Success

There are a number of things about the landmine set up that I love, my bias has become all but a well-kept secret. Nevertheless, when we're talking about shoulders, I believe there's even more to love about the landmine rig. The unfixed base of the landmine creates a pivoting, rotary movement capability. This allows us to have unique precision throughout the broad spectrum of path(s) and range(s) of motion at the shoulder. Ultimately giving us the opportunity to identify and strengthen very specific ROM's under load. There are two additional benefits that I believe the landmine affords us, those being:

- i.) Allows athletes coming off of injury/surgery to use more organic movement strategies while restoring pressing strength rather than being constrained to a fixed load. This is also a prudent solution for athletes who just have cranky or banged up shoulders as well to move in a more natural POM.
- ii.) Speaking to a healthier (or less injured) population, the advantage becomes challenging them to be strong and stable in this wide spectrum of movement under load. In my opinion, there is more "transfer" with movements that account for multiplanar strength and/or control. With the landmine, we can get that in a variety of ways that are highly beneficial for the shoulder.



*Image 5.7- Highly technical graphic showing the contrast in vectors based on barbell position and set-up. The clear advantage with the landmine set-up is not having the vertical load bearing directly down on the joint.*

We mentioned earlier in section 2 about the "hand rule" for athletes who are compromised in flexion ROM, and I think the landmine elucidates this perfectly. When we're using the landmine for pressing, the athlete is in a much better position to move through the upward action with confidence, as their hand can stay within their sight of vision. More technically speaking, this also gives us a safe boundary that precludes them from going into what could be vulnerable ranges of overhead flexion.

The position of the torso relative to the angle of the barbell during landmine movements is another important consideration. By promoting a natural forward trunk lean, the angle of the arm action is in a much more favorable

position for preserving unwanted actions of flexion. The athlete can also use this forward lean by driving into the barbell/base of the landmine and using it as a leverage point. Meaning, we can actively push into the barbell as we go through the pressing action to assist with giving the joint some anterior-posterior stability. I believe that keeping the direct vertical axis of the load out in front of the joint (as compared to bearing directly down in an overhead press) is highly favorable for injured athletes.

## Ball & Socket Joint, Ball & Socket Axis

Intuitively, I don't believe there's a specific structure that benefits from the landmine more so than the labrum. Improving the continuity of the GH joint and promoting coordination between the GH and scapula is about as labral specific as strength training can get. The inherent demand for omnidirectional stability, in my mind, is a game changer for the labrum and other connective tissue. Giving love to these structures is the underpinning to shoulder strength and restoration. Compare this with more conventional applications of pressing, for instance a traditional barbell overhead press. With the BB overhead press the athlete is constrained to the fixed nature of the barbell. This limits the freedom of movement for the joint, forcing a predominantly linear POM for the athlete. Aside from inflicting pain, this can also inhibit the arthrokinematics at the shoulder by constraining the utilization of individual movement signature.

We also need to remain cognizant of what's occurring at the scapula. Using another conventional pressing option such as the bench press for comparison, the landmine promotes uninhibited full scapular motion, whereas the bench press obviously subdues scapular action. I would argue that there is no better way to train full scapular motion under load than with the landmine. Even if we use a more reasonable comparison, one of the more common tendencies with conventional overhead press variations is excessively shrugging up with the traps and dumping into lumbar extension to stabilize overhead. Whereas with the landmine we don't have a direct vertical axis bearing down, it's much easier to control trap engagement while also maintaining a stable, neutral lumbar. None of this is to say there's anything wrong with bench or OH press, but with an injured population especially, I feel the landmine has some decisive advantages.

## Biofeedback

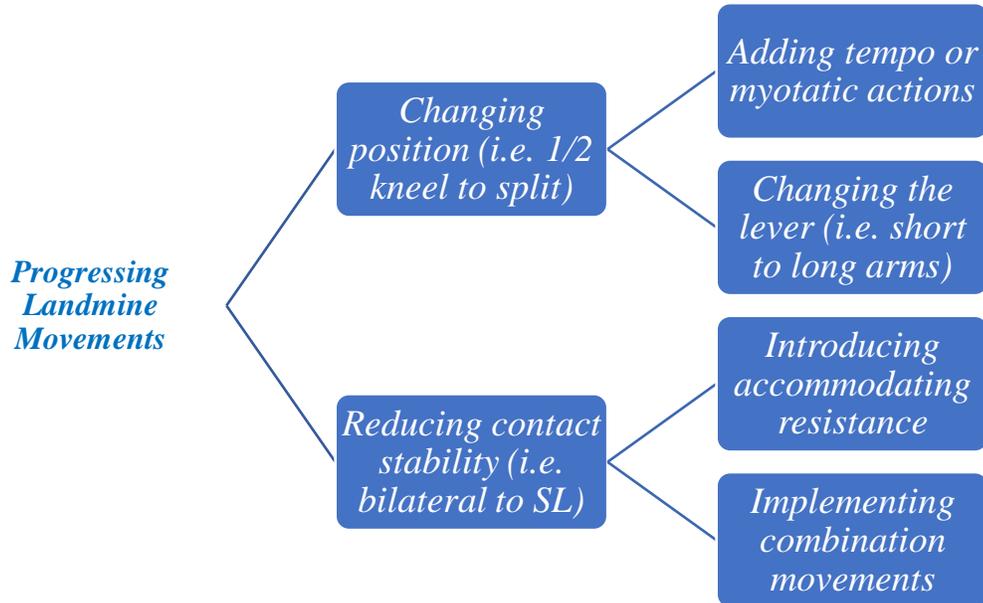
When athletes are coming off of injury, particularly those that are severe and/or require surgery there is going to be an enormous drop in confidence. One of the premiere goals for the coach should always be to indirectly improve an athlete's confidence by taking them from thinking they can't, to proving they can. A major tool to assist with this is providing them with exercises that promote a higher degree of biofeedback. At the end of the day, no matter how good we are or how tight the rapport is with the athlete your word will only carry so far. We are proprioceptive and kinesthetic organisms- *we need to feel to improve.*

The landmine does a tremendous job at exploiting weak or undertrained positions/planes/ranges of movement. This prompts the athlete to heighten their consciousness as they can't simply go into autopilot while going through the set. They will likely have more feedback, or input, to offer you which is always welcomed by the coach. When we get input, we can create conversation, and this is where solutions are truly found.

## Progressing Landmine Movements

	Pressing	Pulling	Combo/Other
Early Phase	<a href="#">1/2 Kneel SA Press</a> <a href="#">SA Floor Press</a>	<a href="#">SA Row from Split</a> <a href="#">SA Pullover</a>	<a href="#">Tempo Push-Up</a> <a href="#">SL Hinge-to-Bend</a>
1st Order Progression	<a href="#">SA Press from Split</a> <a href="#">SA Scap Press (Frontal)</a>	<a href="#">SA Long Lever Row</a> <a href="#">SA Reverse Throw</a>	<a href="#">Pulsing Push-Up</a> <a href="#">1/2 TGU</a>
2nd Order Progression	<a href="#">SA Phantom Press</a> <a href="#">Dynamic SA Press from Split</a>	<a href="#">SL Offset Row (EE return)</a> <a href="#">Unilateral Long Lever Row</a>	<a href="#">Rollout from Crawl</a> <a href="#">OH SA KTS</a>

The basic progression schemes with the landmine movements are no different than with any other piece of equipment or application. We're still going through the same process of monitoring and manipulating variables to provide safe and pragmatic training. As you can notice by looking at the chart above, there are several common progression schemes applied:



Note that nothing listed infers anything about increasing external load. Don't get me wrong here though, adding external load to movements is an absolutely necessary step- but not until it's been earned or needed. I feel that there are a lot of coaches who rush through progression schemes simply because they don't know any better than defaulting to "let's throw another 10 lbs. on there". So many intermediate steps that can have tremendous value for the athlete are being neglected when this is the sole strategy for driving adaptation. In my experience, using more of these intermediate progressions/variations not only helps the athlete to become more proficient with the movements, but also has redeemable value for performance aspects as well. In a sense, I believe that this litany of intermediate progression approach ultimately primes the system (athlete) and transfers directly into both conventional training variations and overall performance outcomes.

## 5.3- ROTATIONAL TRAINING & ARM CARE FOR HEALTHY SHOULDERS

**Author:** Tim Kelly

One of the bigger misconceptions of rotational training is that it should only be reserved for those who are classified as rotational athletes. This is simply untrue, as rotational and anti-rotational concepts should be included in almost any athlete or individuals training. There are several foundational concepts I try to include when programming for my athletes. These can be categorized into the following:



The most common rotational and anti-rotational movements tend to be chop and Palloff variations, respectively. While these are fantastic starting points, it should be understood by the coach that they are not the panacea for rotational-based training. Appreciation for the vast nature of the core musculature, as well as the motor skill requirements for optimal rotational force transfer require training concepts that extend beyond basic, contemporary band or cable movements. In this article, I would like to go into more detail regarding the list of parameters outlined above. Additionally, we'll examine coaching cues or observational key points, improperly performed variations, and programming considerations regarding shoulder health.

### **Ground Reaction Force and Foot Placement**

Obviously, an athlete with a 200lb lift versus a 400lb lift can fare better in a rotational sport simply because they can both produce and absorb more force than the weaker athlete when throwing an object or striking an opponent. However, a fair amount of power is a result of biomechanical positioning, kinetic sequencing, and elastic/fascial properties. Stiff swings and stiff strikes lead to inefficient energy usage and diminished power. We can help bridge the gap from a max lift and the actual skill of the sport by throwing a ball or striking an opponent by giving the athlete proper coaching in some of our exercise variations. Here is a [video](#) depicting poor foot placement or sequencing when doing anti and rotational exercises.

### **Pillar/Core and Motor Control**

The core/pillar is the main variable to achieve optimal force transfer, this is especially the case for throwing and/or rotational athletes as ground reaction force through the arms in a subsequent throw/swing/strike is the lynchpin for performance. One of the main observations that suggests inefficient force transfer is poor rib positioning. Moreover, the presence of general muscle mass ratioed with t-spine mobility can be a more precise analysis for pillar function. For example, consider a 225lb athlete with a bench press 1-RM of 315 lbs. On paper we would assume this is a positive quality for sport but if their lats are so tight they cannot get into overhead flexion without gross compensation or pain then what good is the anterior strength? A combination of soft tissue and overhead core work must be done in order to regain function and balance the system. Eventually, appropriate frequency of each modality will likely minimize anterior shoulder pain.

If there is presence of pain or something just doesn't look right in sagittal-based movements, risk will likely be amplified when we add complexity, multiplanar and rotation into the mix. We want to establish proficiency with simple, controlled movements in single plane actions before we progress forward. We touched on Palloff presses earlier, but there is a lot of detail to this movement that are commonly overlooked. Palloff variations (*my progression chart shown below*) are conventionally applied to emphasize the core, however, there are great benefits for the shoulder as well. If the athlete has known shoulder pathology, then there are several things that need to be addressed. By slightly modifying the movement, the scapula/shoulder girdle function can be addressed accordingly.

Level	Exercise	Position	Coaching Cue
1	Palloff ISO	Neutral	Lats Down
2	Palloff ISO	Retracted or Protracted	Squeeze the Letter
3	Palloff Scap Press	Transitory	Long Ears/Smooth
4	Palloff Press	Transitory	Tempo
5	Palloff Stir the Pot	Neutral	Fast Out/Slow Back
6	Palloff Stir the Pot	Transitory	Tempo/Smooth
7	Palloff Stir the Pot SA Negative	Abd/Add focus	Fast out/Slow Back
8	SA Palloff Stir the Pot	Abd/Add focus	Weathervane
9	Combo Band Row + Palloff Press + Stir the Pot	Transitory	Be an athlete

### [Full Video Progression/Regression](#)

In addition to the anti-movements like the Palloff, generally any contralateral emphasis, or pattern involving the intricacies of the spiral line will be a great place to spend a bulk of your secondary and accessory blocks. If you need further convincing, reread [Danny's sling articles](#).

### **Glenohumeral Stability**

Keep the ball on the socket. Sounds easy right? Well there are a ton of exercise variations and levels of intent that go into building girdle muscular balance and the kinesthetic sequencing that allows for most of the energy to transfer from the ground through the legs and core then whip through a wildly articulating shoulder complex then cleanly rotate/release the energy through the distal limb. Where to start?

Throwing specific? Or Rotational Core Specific? Arm Action Drill? Lower Half Drill?

For those of you in the baseball and softball world, I assume you have heard of [Driveline](#) if not other baseball performance companies like [108 Performance](#), [Top Velocity](#), or [Tread Athletics](#). There are countless more. While I certainly could go into more detail regarding programming and training a baseball athlete, my main focus is on what we can take from the sporting world and directly apply to strength and conditioning. Particularly, the area between rehab and full training; hence, *Restorative Shoulder Strength*. While the average person does not need to throw implements incredibly hard to have healthy shoulders, in fact it usually causes the opposite, there are some derivatives that we can use to further shoulder health with the right application. Plyo care balls have their place in a rehab setting, but also work great as movement prep on upper body intensive days.

## Hand Position

This is the least addressed in the weight room because of the plethora of other exercise that we deem more fruitful in our efforts. A great opportunity to emphasize/experiment varying hand position is during movement prep and accessory work. Not only does each plane of the body rotate to create athletic power, but the joints also are rotational in nature and receive a fair amount of torque in high speeds during sports. The least we can do as strength coaches is briefly touch on these end ranges of stability. Training grip work also has big carry over.

## Programming and Periodization Precision

Rotational exercises are where a coach can test the efficacy of their prior periodization cycles to see if scapular dysfunction or global movement patterns are continuing to irritate or present risk for the athletes' shoulder pathology. Furthermore, a variety of the exercise variations demonstrate d have a plethora of implementation and will need to be programmed to best fit the athletes needs and placement during their competitive season. Considerations for implementing rotational and shoulder-focused variations in general health are important as well when training general population.

Week	Phase	Intensity	Volume	Frequency/Skill
Week 1	Post Rehab/General	Low	Medium	High
Week 2	Post Rehab/General	Low	Medium	High
Week 3	Function/Musc End/GPP	Medium	Medium	Medium
Week 4	Function/Musc End/GPP	Medium	Medium	Medium
Week 5	Strength	High	Low	Medium
Week 6	Strength	High	Low	Medium
Week 7	Strength	High	Low	Medium
Week 8	Dynamic	Near Max	Low	Low
Week 9	Dynamic	Near Max	Low	Low
Week 10	Dynamic	Near Max	Low	Low
Week 11	Conjugate/Contrast	Undulates	Undulates	Undulates
Week 12	Conjugate/Contrast	Undulates	Undulates	Undulates

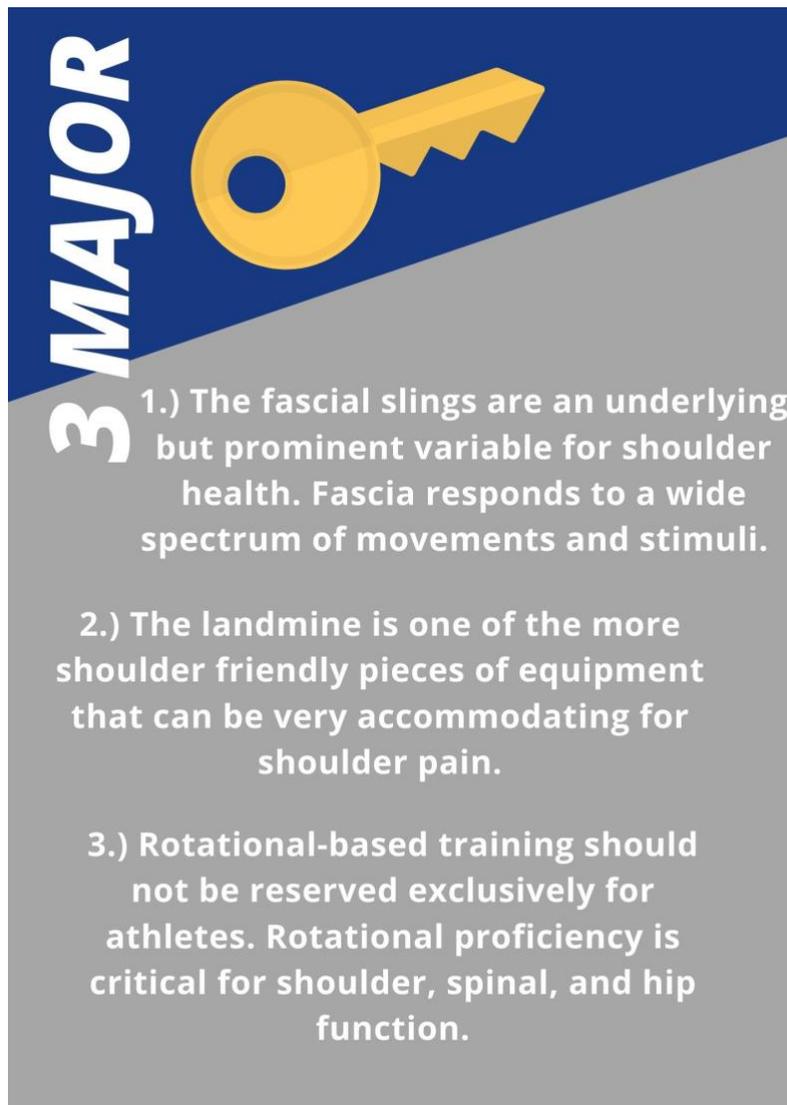
Image 5.7- General overview illustrating the modifications of primary training volumes. (Original image)

Now in a general population we most like aren't getting to true dynamic based excises by weeks 8-12. However, I encourage the primal patterns and VBT based lifts in those that are capable. Some people may take 2 to 4 meso cycles of 12 weeks before they are ready for dynamic exercises.

## Big Picture

To understand what a complete training cycle looks like, and the variety of modalities used to build resilient shoulder girdles please watch [this video](#) (via Chris Herman YouTube). We must remain cognizant of the complete chain linking the shoulder to the lower halves during force transfer. Training the body accordingly is what allows for fluent and efficient shoulder health. Not everything is CAR's like YTW's. That is one spectrum. Likewise, not everything should revolve around throwing an implement. Notice how in the above Javelin video they train hip mobility, t-spine mobility, sprints, plyometrics, MB work, max bench work, and gymnastic work like handstands, planches, iron cross/ring ups. There is a wide berth of training that allows these humans to hurl spears the length of a football field. Appreciate how they are attacking a variety

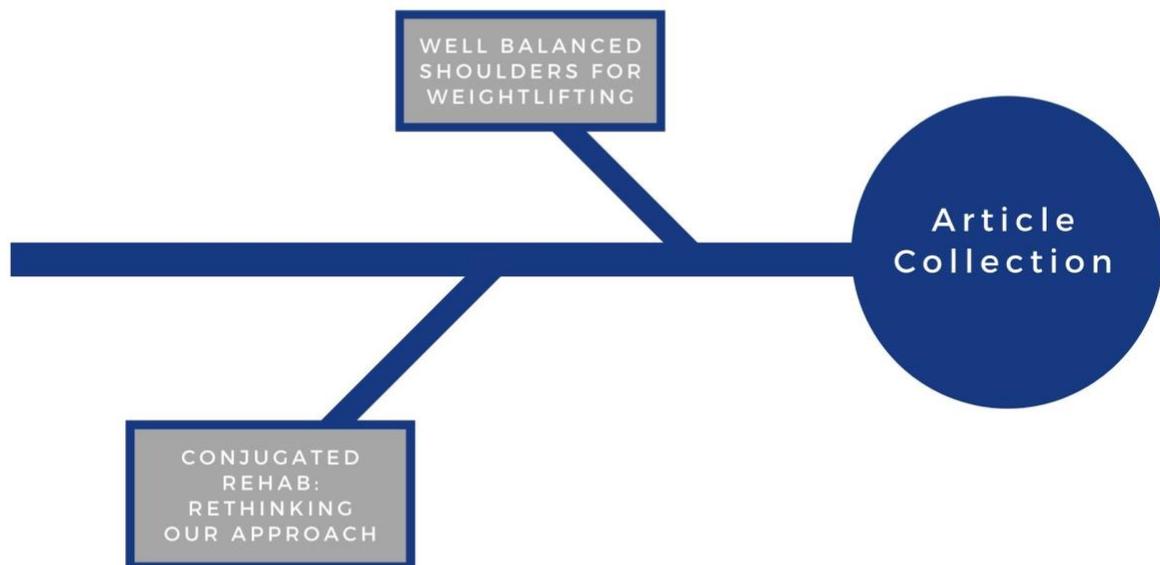
of angles and planes, utilizing a spectrum of velocities and tempos, and variations of positions and loads. The spectrum applied elucidates what's required of shoulder that can withstand max effort hurling attempts. I'm not saying that all of these should be sampled by everyone nor required to attain healthy shoulders, but it should illustrate the necessity of utilizing a wide spectrum of exercises to periodize and program. Note: For Javelin training spectrum please see [Appendix 7](#).



**3 MAJOR**

- 1.) The fascial slings are an underlying but prominent variable for shoulder health. Fascia responds to a wide spectrum of movements and stimuli.
- 2.) The landmine is one of the more shoulder friendly pieces of equipment that can be very accommodating for shoulder pain.
- 3.) Rotational-based training should not be reserved exclusively for athletes. Rotational proficiency is critical for shoulder, spinal, and hip function.

# BONUS CONTENT



Contribution From: Nicole Foley, MS, CSCS, USAW and  
Jeremy Aspa, MS, LAT, ATC, USAW, CDNLVL1

## WELL-BALANCED SHOULDERS FOR WEIGHTLIFTING

Author: Nicole Foley

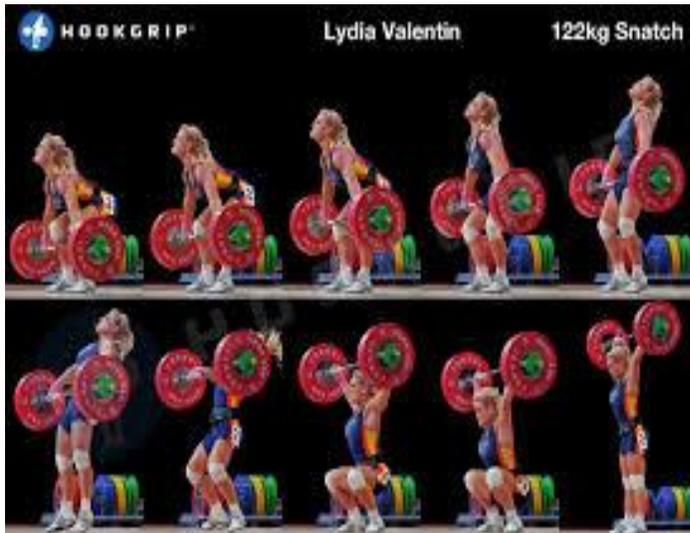


Figure B1- Frame-by-frame breakdown of the snatch during competition. (Image via Hook Grip)

The sport of Olympic Weightlifting consists of two competitive lifts; the snatch and the clean and jerk. In order to be successful in these multi-joint whole-body lifts, the athlete must achieve dynamic strength and peak power at some of the highest absolute levels. It doesn't take a coach's eye to take note of the demand placed on the shoulders to execute these movements. Weightlifting programs vary among countries and coaches, but a common characteristic is the frequency of high-intensity resistance exercise movements (27). As a coach or an athlete, monitoring the training variables is extremely important- especially for total volume.

Due to the repetitive nature in training and movement, there is always a concern for chronic injuries. A common misconception driving people to become reluctant to try weightlifting is the risk of sustaining an acute injury. Everyone sees the dynamic aggression of the lifts and the rapid velocity of the bar flying overhead prompting them to shy away. The reality is that if coached correctly and given the appropriate training considerations based on a thorough assessment, there isn't any more or less risk assumption than any other lift (i.e. bench press/back squat). This is supported in a study conducted by (1), who found that the risk of sustaining acute injury in weightlifting is no greater than other traditional contact sports. This does not, however, speak to the risks for chronic injury manifestations.

In Olympic weightlifting, there is a lot happening in the shoulder complex in each of the lifts. During the third pull of both the snatch and the clean, we are seeing internal rotation and abduction at the GH joint. In the catch position of the clean, we are looking at slight protraction and downward rotation of the scapula and external rotation at the GH joint. And in the overhead position of the snatch and the jerk, there is flexion, external rotation, and abduction at the glenohumeral joint and retraction and upward rotation at the scapula, as well as stabilization once the bar is overhead.

Based on an athlete's assessment, determining whether an athlete needs more mobility or stability work is a foundational step to establishing their weightlifting technique. The caveat to this is that everyone needs a little bit of everything, but we do want to emphasize certain aspects based on what the athlete shows us. USAW (USA Weightlifting) has a basic assessment to take athletes through before they begin. It is not the only assessment that should be used when evaluating an athlete's movement sequence, but it's a good place to start in regard to the Olympic lifts. The USAW screen focuses on proper positions needed for weightlifting, including

an overhead press, front rack position, overhead squat, and snatch deadlift position (shown below). Whether an athlete can get into these positions and how they do so will determine the warm-up (movement prep) and accessory protocol that we will program.



Olympic weightlifting is a gentle balance of mobility and stability. When you have athletes that are extremely lax in their tendons and joints, then we need to counteract that and develop more stability and vice versa. Weightlifting is often viewed as archaic in its programming and training ideologies. Older coaches believe that if you want to get better at snatch and clean and jerk, then you have to snatch and clean and herk. Although this is obviously true, there are other things that can be done to help facilitate good movement patterns and allow the athlete a better opportunity to understand and improve their technique when things are working properly and moving efficiently. If something is efficient than it is effective, and the body's kinematics are no different.

It is my firm belief that weightlifters should be held to the same standard as any other athlete involved in traditional sports. Weightlifters are athletes, no one would deny that, however, unlike football and basketball players who spend time at sport-specific practices and weight room training, weightlifters are only found in the weight room. Our "sport-specific" training should be a combination of the Olympic lifts and their derivatives to improve strength and technique as well as more traditional strength training, including the main lifts of squats and deadlifts. Where I feel a lot of people have missed the boat are those "accessory" movements. There is a lack of interest in the small details of lifting, but I believe this is where the game can be changed to help build stronger and overall healthier lifters.

Athletes complain that they have already spent so much time in the gym that they will skip out on their accessory work, but I would argue that based on an athlete's capabilities these are some of the most crucial parts of their training. So, in an effort to guide my athletes I have begun adding in some more non-traditional movement prep as part of their warm-up. This challenges the athlete to move in different ways outside of the snatch and clean and jerk while still focusing on the biomechanical goals of the lifts and needs of the athlete. Below are some of my go-to warm-up and movement prep exercises I use based on whether an athlete needs more stability or mobility in the shoulder.

<b>Mobility</b>	<b>Stability</b>
<a href="#">Band OH Press</a>	<a href="#">DB Roll to Press</a>
<a href="#">Band Y-Raise</a>	<a href="#">½ Kneel B.U. KB Press</a>
<a href="#">Band Ext. Rotation to Press</a>	<a href="#">Bear Crawl w/ Mini Band (wrist)</a>
<a href="#">Band OH Pull-apart</a>	<a href="#">KB Windmill</a>

It can be argued that each of these categories can be interchangeable and I would certainly agree. In essence, you're never really training mobility without training stability and vice versa. Since these movements are often incorporated more in the warm-up than at the end, it is important for the athlete to understand the intent behind the exercise. That includes whether the emphasis for them is on the mobility or stability side for them as well as how this will correlate to weightlifting. These exercises do no good if the athlete is just going through the motions in order to jump on the platform. I find that by simply connecting the dots, the athlete immediately changes their mindset during the exercises.

For example, if we are doing a band y-raise, we want to focus on keep the ribs closed and the spine neutral as the shoulders flex overhead. Why? Well as coaches we know this is the most efficient and proper way to get the shoulders to do their job and not allow for other muscles to compensate and contribute to extra ranges of motion that the athlete isn't capable of, but athletes don't always care about that. What they do care about is the ability to improve that overhead flexion while keeping the ribs closed, because that is going to improve the catch position of their snatch. Remember, these warm-up movements don't need to be overly technical, they just need to be efficient and intentional. The more the movements can mirror the proper overhead angles seen in the snatch the more beneficial the carryover will be to the lifts.

This prescription of warm-up and movement preparation does not replace an empty bar warm-up, this is in addition to that. Having the athlete begin with an empty bar is something I believe is vital to a warm-up, but that is for a whole other slew of reasons and will be saved for another article. These movements are to simply provide an outlet for the athlete to work on some of their limitations within the shoulder that play a major role in the lifts. It can also be an opportunity to take the athlete out of their comfort zone and allow them to work through various ranges of motion and movement planes around the joint. The goal is overall shoulder health. The healthier the shoulder complex, the less susceptible it will be to unforeseen movement errors. Weightlifting is repetitive in nature and if the athlete only trains with that one mindset than they are missing the boat on overall health and the ability to prevent overuse injuries.

## CONJUGATED REHAB

Author: Jeremy Aspa

My closest colleagues in the strength realm understand that I'm very biased towards conjugate periodization. Why? I honestly don't know haha. A lot of strength professionals I've come into contact with are either with it or against it. But in all seriousness, I'm just a fan of this approach, and I can't ignore the results I've had with my athletes. The methodology speaks to me. Not to mention I'm a huge enthusiast of the Westside principals and mentality. The operative component to the conjugate system is that it can be manipulated however you want based off the needs of the athlete; and this is the case whether we're talking elite level powerlifters, or rehab and restorative strength for athletes and general population.

A couple years ago I thought, if the conjugate system works in the powerlifting and athletic populations, why wouldn't it work in an orthopedic rehabilitation setting? More specifically, in a traditional athletic training setting such as a Division-I athletic setting. I'm fortunate to have a high volume of contact with my athletes, granting me a lot of time to rotate different systems. If you break down the conjugate system, *it focuses on weaknesses, optimizes recovery, and ultimately promotes health and longevity in the organism*, while at the same time allowing them to **always be ready to perform at a high level**. Isn't that what we would want in a rehab program? Obviously, it is not a wise approach for immediate post-surgical cases, but what about the cases that aren't post-surgical? In my work setting, it's extremely common for athletes to continue to compete with some type of chronic injury, especially in season.

Working in college athletics for a handful of years, I've always had athletes that experience moderate amounts of pain although while remaining functional. In many instances, these injuries would begin in the middle of their preseason and sometimes last to nearly the end of the regular season. The chronicity of their pain is way ahead of their body's ability to heal and repair for most of these athletes. In my first couple years of working in the field as an athletic trainer, I would build up a rehab program that would eventually be so immense in volume that they'd be extremely fatigued from the previous days rehab session. When they came in to see me the following days, they wouldn't be ready to rehab due to their accumulated stress over time. To my own fault in the past, athletes would be constantly doing high volume isolation work, more functional movement, plyometrics, and slower velocity strength work. What I was missing, however, is not accounting for the body's demands in weight training, conditioning, and practice. I've even witnessed in some cases, despite doing so much rehab, athletes who would still decline in strength and function. With the external pressures of coaching staffs and needing to have roster depth, there needed to be another way to approach treatments and rehab better because it was the athlete's job to compete.

It was through this recollection of thoughts that I decided to adopt the conjugate system of methods within my own rehabilitation philosophy for the athletes I worked with. In my opinion, I think that in doing so it beautifully bridged the gap between the functional side of rehab and the performance piece for my athletes to safely remain on the field. It maintains the continuity within the athlete's holistic plan to continue to perform maximally and optimally. This is why I feel that healthcare practitioners working with high performance athletes need to truly understand the perspective of periodization and strength training outside of the "only bodybuilding" and the

“three sets of ten repetitions mentality”. In doing so, it made me a better clinician and did more of a favor overall with my athletes under my supervision of care.

This isn't a complete lecture series on conjugate periodization, but rather why I chose to use it for my athletes for rehab. I could be completely off my rocker here and most rehab practitioners may call it bullshit, but anecdotally I have gotten extremely great results. If you are not familiar with conjugate periodization and/or would like to take a closer look and dissect the training methodologies of conjugate training, I recommend reading Louie Simmons's [Westside Barbell Book of Methods](#) or refer to [Elitefts.com](#) and study their dense catalog regarding all things westside and conjugate training.

For those of you who are extremely familiar with the conjugate system, you will notice that my reasoning for using this system in my rehab isn't any different from why a powerlifter or an Olympic weightlifter would utilize this for their weight and conditioning training. So, with that all being said, here are three reasons why I've gravitated to the conjugate rehab with my non-surgical rehab cases.

### **REASON 1: ADAPTATION/MANIPULATION**

What is the conjugate system? There are many definitions; in a nutshell the conjugate training system utilizes 4 main lift days. Those days include 2 days dedicated to the max effort method where maximal loads move at slow velocities. One day being a max effort upper body day, and another being a max effort lower body day. Next are the other 2 days dedicated to the dynamic effort method at which the lifter moves sub maximal weights at higher velocities to train a higher rate of force development. Those 4 intense workouts would be separated roughly 72 hours apart with bodybuilding, conditioning, and functional workouts in between (the other days). The week for example would present as Monday ME Lower, Wednesday ME Upper, Friday DE Lower, Sunday DE Upper.

My thought process in rehab is that once I understand what we are rehabbing in terms of the involved structures, we can thoroughly understand the weaknesses we need to address. Louie Simmons of Westside Barbell always mentions that mathematically, a pyramid is only as tall as its base. By continuing to build a wide strength base, it trains the shoulders to be strong in awkward positions and movements. With weakness identification, we can thoughtfully map out and seek the adaptations we need. In chronic situations where the athlete will have flare ups of pain during a competitive calendar year, we can then manipulate variables and identify new weaknesses while chasing the same positive results. Ultimately, we are not reverting back to the same ways, rather seeking to understand different pain generators.

Utilization of conjugation can allow us to freely manipulate the program week by week in real time based off if the athlete is progressing or regressing. Allowing us to continually change the modes of how we are delivering certain movement patterns and stimuli allows the athlete to continue to master different contractions, velocities, and angles to ensure a confident command of his or her shoulder movement. It allows to train awkward planes in which injury occurred. Again, if it's a chronic occurrence, having 2- or 3-week waves of a different max effort and dynamic effort intent ensures us that we are continuously challenging the organism without sacrificing our end goal of being functional and pain free.

I follow roughly a 48-hour window between harder rehab sessions to ensure better tissue recovery between sessions. Though we are not lifting, nor is rehab extremely CNS taxing, it allows the athlete to be more compliant of his or her program. It also decreases psychological burnout that comes with rehab by just going through the motions. Not to mention it safely allows us to chase our adaptations we want to elicit in a methodical fashion. Like lifting, it ensures that we are constantly changing and cycling different variations. We can rehab based on needs and allows the athlete to train what they tend to ignore because they dislike it. It's important to rotate different stimuli on the same patterns to not only get better, but to simply become stronger. If I can compare it to a weightlifting analogy, I would much rather have an athlete strong in multiple squat variations than just have them being good at a straight bar back squat.

## **REASON 2: OPTIMIZATION**

Another reason I love this approach is that we continue to rehab at an optimal rate. Some days are intense, and some days are just volume work to build up weak muscles. Overall, we continue to rehab, but still ride the force velocity curve. This is extremely important to me especially in season. It bothers me when rehab actually becomes a factor contributing to chronic residual pain and tendinopathies develop from overuse because volume is way too high. A study by Magnusson et al, 2010 revealed that there was a net loss of collagen production 24-36 hours post heavy exercise with very heavy loads. This leads me to realize that even in rehab we can't overlook that tendons need recovery to allow adaptation to occur. This may explain the reasons why athletes in some cases can develop tendinopathy and residual pain after rehab. Doing too much with improper volume dosages paired with inadequate rest maybe pushing the athlete backwards in the healing process.

Occupation and sport will demand different needs, but in a rehab world I'm thinking, how can I bullet proof the area I'm rehabbing? I need to make sure that the body part accepts max force from external forces and make sure the body part can produce and redirect forces in different and awkward planes. The conjugate system is a way to monitor total volume, central nervous system load, recover better from the previous rehab session, and vary the modes of intent. In my work, it provides a great way to optimize rehab over the course of a competitive calendar year.

We don't need to just be more fit within our joint, but we need to ensure function and coordination through optimal motor outputs. On days that are mostly isolation focused, such as doing classical rehab exercises, it's a great way to work both general physical preparedness of the joint from an endurance standpoint, as well as prepotentiate muscle groups before a lift or practice.

## **REASON 3: INTENT OF METHODS**

Constant use of only a singular method makes your adaptations stall. We covered earlier that too much too soon is a no go. Let's visit the max effort method. Using this method of training in a rehab setting doesn't necessarily mean lifting maximal loads at slow velocities all the time, but rather having a max "EFFORT" intent such as holding an isometric contraction at a certain angle of a range of motion. In this case, the intent was a max effort because the effort was indeed maximal of the athlete in order for them to hold that position. This technique allows us to safely work certain ranges of motion that might be dysfunctional. On the flip side to that, we can properly micro dose and utilize the dynamic effort method such as sub maximal loaded throws to

ensure we do not lose the capacity to generate high rates of force production. Whichever method you choose to use, we must always make sure that we are monitoring accumulated volume over time. Remember the goal is to maximize our exercises without running the risk of breaking the athlete down and having negative effects. Having intent of movement always matters.

**APPLICATION**

So, what does all this tangibly look like? Below is a snapshot of what a typical week can look like in season for me with Men’s Lacrosse. I will use a slightly similar case I had this season for illustration purposes.

**Patient Profile:**

**Patient:** 20-year-old male

**History:** Chronic right anterior shoulder pain. History of right shoulder arthroscopic labral repair from previous season.

**Chief complaint:** Experiencing anterior shoulder pain in right shoulder again after completing preseason training camp. No new dislocations or macro traumas.

**Diagnosis:** General capsular pain/irritation from chronic inflammation

**Differential Diagnosis:** Rotator cuff strain, bursa irritation

DAY	METHOD & EFFORT	TREATMENT/THERAPEUTIC EX.
SUNDAY	Repetition Method	<p><b>TISSUE TEMP/MANIPULATION/WARM UP:</b></p> <ul style="list-style-type: none"> <li>-Hot pack or diathermy</li> <li>-Arm bike</li> <li>-Effleurage Massage &amp; shoulder/spinal traction</li> <li>-Manual D1/D2 PNF exercise</li> <li>-Manual perturbations at varying end points</li> </ul> <p><b>THERAPEUTIC EXERCISE:</b></p> <ul style="list-style-type: none"> <li>-Single arm I, T, Y</li> <li>-ER @ 0 degrees</li> <li>-Side lying ER</li> <li>-ER @ 90 degrees</li> <li>-Scaptions</li> <li>-Empty can’s below shoulder height</li> <li>-Black burns</li> <li>-Banded back rows</li> <li>-Band pull apart</li> <li>-Cheerleaders</li> <li>-Terrible fives</li> <li>-Banded wall slides</li> <li>-Serratus punch variation</li> </ul> <p><b>POST THEREX:</b></p> <ul style="list-style-type: none"> <li>-Medicated phonophoresis w. topical NSAID</li> <li>-Lymphatic dry needling</li> <li>-Shoulder traction and mobilization</li> <li>-NormaTec</li> <li>-Ice (at home)</li> <li>-OTC NSAID</li> </ul>

<p style="text-align: center;"><b>MONDAY</b></p>	<p style="text-align: center;">Max Effort Method (low volume/high intensity)</p>	<p><b>TISSUE TEMP/MANIPULATION/WARM UP:</b></p> <ul style="list-style-type: none"> <li>-Hot pack or diathermy</li> <li>-Full body dynamic warmups</li> <li>-Effleurage Massage &amp; shoulder/spinal traction</li> <li>-Manual D1/D2/SCAPULAR PNF exercise</li> <li>-Manual perturbations at varying end points</li> <li>-RPR</li> </ul> <p><b>THERAPEUTIC EXERCISE:</b></p> <ul style="list-style-type: none"> <li>-Cheerleader series</li> <li>-Half kneeling ER @ 90 degrees with overhead press</li> <li>-Banded explosive D2 extensions</li> <li>-Max effort intent isometric holds at end ranges</li> <li>-Max effort single arm overhead press variation in scapular plane with end range perturbations</li> <li>-Max effort intent on loaded push variation horizontally and overhead</li> <li>-FRC inspired work</li> </ul> <p><b>POST THEREX:</b></p> <ul style="list-style-type: none"> <li>-Medicated phonophoresis w. topical NSAID</li> <li>-Shoulder traction and mobilization</li> <li>-Diathermy</li> <li>-NormaTec</li> <li>- (Cold tub post practice)</li> <li>-Ice (at home)</li> <li>-OTC NSAID</li> </ul>
<p style="text-align: center;"><b>TUESDAY</b></p>	<p style="text-align: center;">Repetition Method</p>	<p><b>TISSUE TEMP/MANIPULATION/WARM UP:</b></p> <ul style="list-style-type: none"> <li>-Hot pack or diathermy</li> <li>-Arm bike</li> <li>-Trigger point massage &amp; shoulder/spinal traction</li> <li>-Manual D1/D2 PNF exercise</li> <li>-Manual perturbations at varying end points</li> <li>-Scrapping</li> <li>-Cupping</li> </ul> <p><b>THERAPEUTIC EXERCISE:</b></p> <ul style="list-style-type: none"> <li>-Single arm I, T, Y</li> <li>-ER @ 0 degrees</li> <li>-Side lying ER</li> <li>-ER @ 90 degrees</li> <li>-Scaptions</li> <li>-Empty can's below shoulder height</li> <li>-Black burns</li> <li>-Banded back rows</li> <li>-Band pull apart</li> <li>-Cheerleaders</li> <li>-Terrible fives</li> <li>-Banded wall slides</li> <li>-Serratus punch variation</li> </ul> <p><b>POST THEREX:</b></p> <ul style="list-style-type: none"> <li>-Medicated phonophoresis w. topical NSAID</li> <li>-Lymphatic dry needling</li> </ul>

		<ul style="list-style-type: none"> <li>-Shoulder traction and mobilization</li> <li>-NormaTec/GameReady</li> <li>-Ice (at home)</li> <li>-OTC NSAID</li> </ul>
<b>WEDNESDAY</b>	Dynamic Effort Method	<p><b>TISSUE TEMP/MANIPULATION/WARM UP:</b></p> <ul style="list-style-type: none"> <li>-Hot pack or diathermy or warm tub</li> <li>-Full body dynamic warm up</li> <li>-Trigger point massage &amp; shoulder/spinal traction/trigger point dry needling</li> <li>-Manual D1/D2/SCAPULAR PNF exercise</li> <li>-Manual perturbations at varying end points</li> <li>-Scrapping</li> <li>-Cupping</li> </ul> <p><b>THERAPEUTIC EXERCISE:</b></p> <ul style="list-style-type: none"> <li>-Cuff warm up</li> <li>-Push ups</li> <li>-Plyo pushups on to box (multiple variations)</li> <li>-Dynamic and static perturbation (multiple variations)</li> <li>-Single arm wall ball 20 min</li> <li>-FRC inspired work</li> </ul> <p><b>POST THEREX:</b></p> <ul style="list-style-type: none"> <li>-Medicated phonophoresis w. topical NSAID</li> <li>-Lymphatic dry needling</li> <li>-Shoulder traction and mobilization</li> <li>-NormaTec/GameReady</li> <li>- (Ice tub post practice)</li> <li>-Ice (at home)</li> </ul>
<b>THURSDAY</b>	Dynamic Effort Method	<p><b>TISSUE TEMP/MANIPULATION/WARM UP:</b></p> <ul style="list-style-type: none"> <li>-Hot pack or diathermy or warm tub</li> <li>-Arm bike</li> <li>-Trigger point massage &amp; shoulder/spinal traction/trigger point dry needling</li> <li>-Manual D1/D2 PNF exercise</li> <li>-Manual perturbations at varying end points</li> <li>-Scrapping</li> <li>-Cupping</li> <li>-RPR</li> </ul> <p><b>THERAPEUTIC EXERCISE:</b></p> <ul style="list-style-type: none"> <li>-Terrible fives</li> <li>-Cheerleaders</li> <li>-Half kneeling ER @ 90 with overhead press</li> <li>-Explosive D2 flexion with band</li> <li>-Bodyblade variations</li> <li>Medball throws (ALL VARIATIONS)</li> <li>-Single arm catch with single leg balance with perturbations</li> <li>-Explosive IR med ball throws</li> <li>- Explosive ER posterior toss and D2 extension toss</li> </ul>

		<b>POST THEREX:</b> -Medicated phonophoresis w. topical NSAID -Shoulder traction, mobilization, and manipulation -Normatec/gameready - (Ice tub post practice) -Ice (at home)
<b>FRIDAY</b> (TRAVEL DAY)	Strict Modality Day/Mobility Work: <i>We also focus on remobilizing from stiffness of travel from long bus rides and plane travel</i>	<b>HOTEL TREATMENT:</b> -Hypervolt massage gun -Effleurage massage -Light scrapping -Dry needling, trigger points -Full body mobility/stretch routine -Spinal manipulations -Parasympathetic breathing -Normatec/Gameready/Ultrasound -Kinesiotaping
<b>SATURDAY</b> (COMPETITION)	<b>GAME DAY</b>	MOBILITY/RPR/WARM UP/TOPICAL CREAMES pre-game. ICE post-game

I typically include a separate home exercise program for each of my athletes. It includes only a handful of exercises for extra cuff work that can be done without my assistance just to get another quick session of muscle activation work at home. This is to be done in the evening before bed when we are not traveling. This promotes continued micro dosing rehab sessions over time.

This chart represents a small snapshot out of an entire year. Again, I switch things up frequently in 2-3-week waves. However, I think the proof is in the pudding. For example, an average NCAA Division – 1 men’s lacrosse roster is typically about 44 players. With 10 players on the field at a time, a 44-man roster allows for substitutions if a position player needs some rest. This last season we only had 25 players total, but only 22/23 traveled. We had 3 home games and 10 away games. Before the COVID pandemic cancelled NCAA competition for the rest of the 2020 spring season nationwide, I’ve had almost everyone available for every single game. The only time I had someone not available for a game was due to either a concussion or a massive acute trauma. And with the acute trauma, the athlete only missed 1 game. Overall, everyone was healthy from a soft tissue perspective and everyone was in incredible shape. I whole heartedly believe that this was made possible from the execution of the conjugate piece in the weight room I implemented as their strength coach and the conjugate piece I implemented in the training room as their athletic trainer. The beauty of all of this, is that I had full control of their training and rehabilitation with the conjugate principals as the glue that kept them together. In my opinion, an intelligent healthcare clinician wielding these concepts, can dramatically make your job easier from an injury standpoint. The only way to find out, would be to implement them firsthand.

## CLOSING

### *“Don’t focus on the problem, find the solution”*

On behalf of the group, if you’ve made it to this point, we sincerely cannot thank you enough. We really had a blast collaborating on this project and are overwhelmingly pleased with the final outcome. We hope that this product resonated with you in some way, and you were able to take away tangible applications for training. We do kindly ask you the small favor of sharing this with others who will benefit.

There is more information, more resources, and more accessibility than ever before. There is also, however, more misinformation, distractions, and impedance than ever before. I truly believe we are a part of/experiencing a pivotal point in human evolution. Throughout my maturity I’ve learned {personally and professionally} that life is nothing more than an amalgamation of countless micro decisions. We often miss the mark by becoming myopic and often dismayed with the final outcome, while never analyzing the accumulation of steps that brought us to the end point. Conversely, we should emphasize the continuum of decision making. Be deliberate with your environment and those who influence your behaviors, conscientious of your decision making, and acutely appreciative of time.

At the crux of decision making is the ability to solve problems in a timely and pragmatic manner. As this relates to coaching, I believe that fundamental problem solving is one of the most overlooked traits coaches aspire to possess. Problem solving and critical thinking demand consciousness, which will lead you to examining the training rather than going through the motions. And these skills empirically rely on the decisions you make in real time... day-to-day, hour-to-hour, and minute-to-minute. It’s easy defaulting to emphasizing the problems that manifest, in part because it provides us an excuse to feel bad for ourselves and cope. We must actively work to shifting our focus to finding a solution.

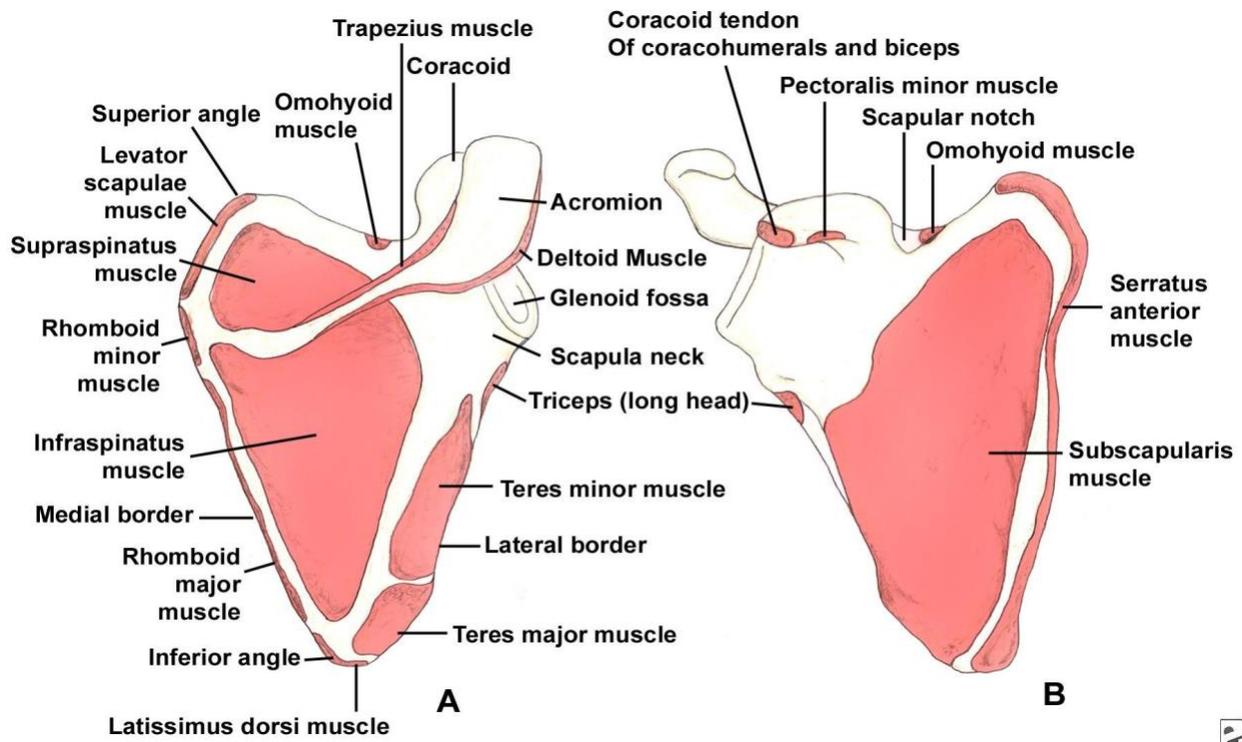
If I can leave you with a personal note- As I type this, I’m exactly a month away from turning thirty, and like most- this has come with some difficulty. Although difficult, it has also prompted some deep introspection and appreciation. Coming into my 20’s, I was on the cusp of being kicked out of school, fired from work, evicted from my apartment and generally fuck up just about every meaningful relationship in my life. In that time never, ever, would I have believed that before turning 30 I’d be married to the most incredible woman on the planet, holding a master’s degree, a CSCS with Distinction, run a website with over 1,000 subscribers, present at an NSCA conference, self-publish three books and have what I’d consider to be a dream job at VHP. I don’t mention this as some sort of humble brag, I really don’t. My point in addressing this is that everything seems chaotic, overwhelming or even impossible until you’re looking back on it. But it’s impossible to get yourself ahead until you can detach from a constrained perspective. Shit never gets easier, you just get better.

If you want to change the outcome, you must change the input. When you’re willing to do more than what’s required of you, you’re able to go further than what’s expected of you. **Don’t focus on the problem, find the solution.** -DF

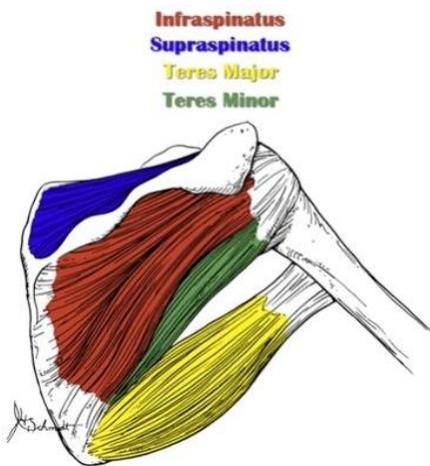
## APPENDIX

## A1.) SCAPULAR ATTACHMENTS

NOTE: Image via Human Kinetics



## A2.) ROTATOR CUFF MUSCULAR ACTIONS



Muscle	Primary Action	Secondary Action
Suprascapularis	Humeral Abduction (0-15°)	Synergist to humeral abduction (15-90°)
Infraspinatus	External rotation	Humeral extension
Teres Minor	External rotation	Assists in extension and adduction
Subscapularis	Internal rotation	Assists in humeral extension and depression

### A3.) MUSCULAR ACTIONS OF SHOULDER COMPLEX

**NOTE:** Chart extracted via Amac Training

Muscles of the shoulder joint			
Movement	Prime Mover	Origin	Insertion
Flexion	Anterior deltoid	Clavicle, scapula and acromion process	Humerus
	Upper part of pectoralis major	Clavicle, sternum and ribs	Humerus
	Coracobrachialis	Scapula	Humerus
	Serratus anterior	Side of ribs	Scapula
Extension	Posterior deltoid	Clavicle, scapula and acromion process	Humerus
	Latissimus dorsi	Ilium, lumbar and thoracic vertebrae	Humerus
	Teres major	Scapula	Humerus
Horizontal flexion	Pectoralis major	Clavicle, sternum and ribs	Humerus
Horizontal extension	Trapezius	Cervical and thoracic vertebrae	Scapula
Abduction	Medial deltoid	Clavicle, scapula and acromion	Humerus
	Supraspinatus	Scapula	Humerus
Adduction	Lower part of pectoralis major	Clavicle, ribs and sternum	Humerus
	Latissimus dorsi	Ilium, lumbar and thoracic vertebrae	Humerus
	Teres major	Scapula	Humerus
	Teres minor	Scapula	Humerus
Medial rotation	Pectoralis major	Clavicle, sternum and ribs	Humerus
	Subscapularis	Scapula	Humerus
	Latissimus dorsi	Ilium, lumbar and thoracic vertebrae	Humerus
	Teres major	Scapula	Humerus
	Anterior deltoid	Clavicle, scapula and acromion process	Humerus
Lateral rotation	Infraspinatus	Scapula	Humerus
	Teres minor	Scapula	Humerus
	Posterior deltoid	Clavicle, scapula and acromion process	Humerus
	Lower trapezius	Cervical and thoracic vertebrae	Scapula

\* Prime movers shaded grey are the principle muscles causing the movement.

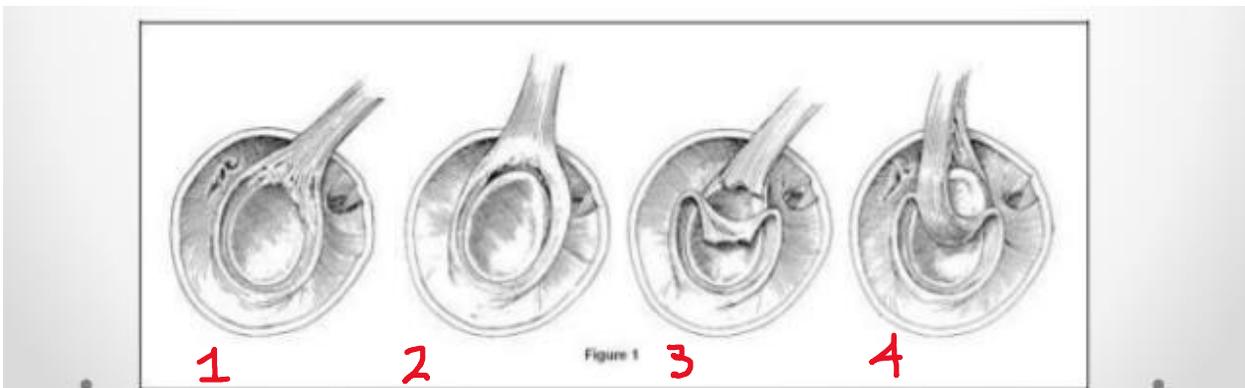
#### A4.) JOINT CLAUSTROPHOBIA

**NOTE:** Image is screenshot of [YouTube dissection](#) via Anatomy Dissections. Purpose of this image is to illustrate the extremely cluttered nature of the shoulder.



#### A5.) LABRAL TEAR CLASSIFICATIONS

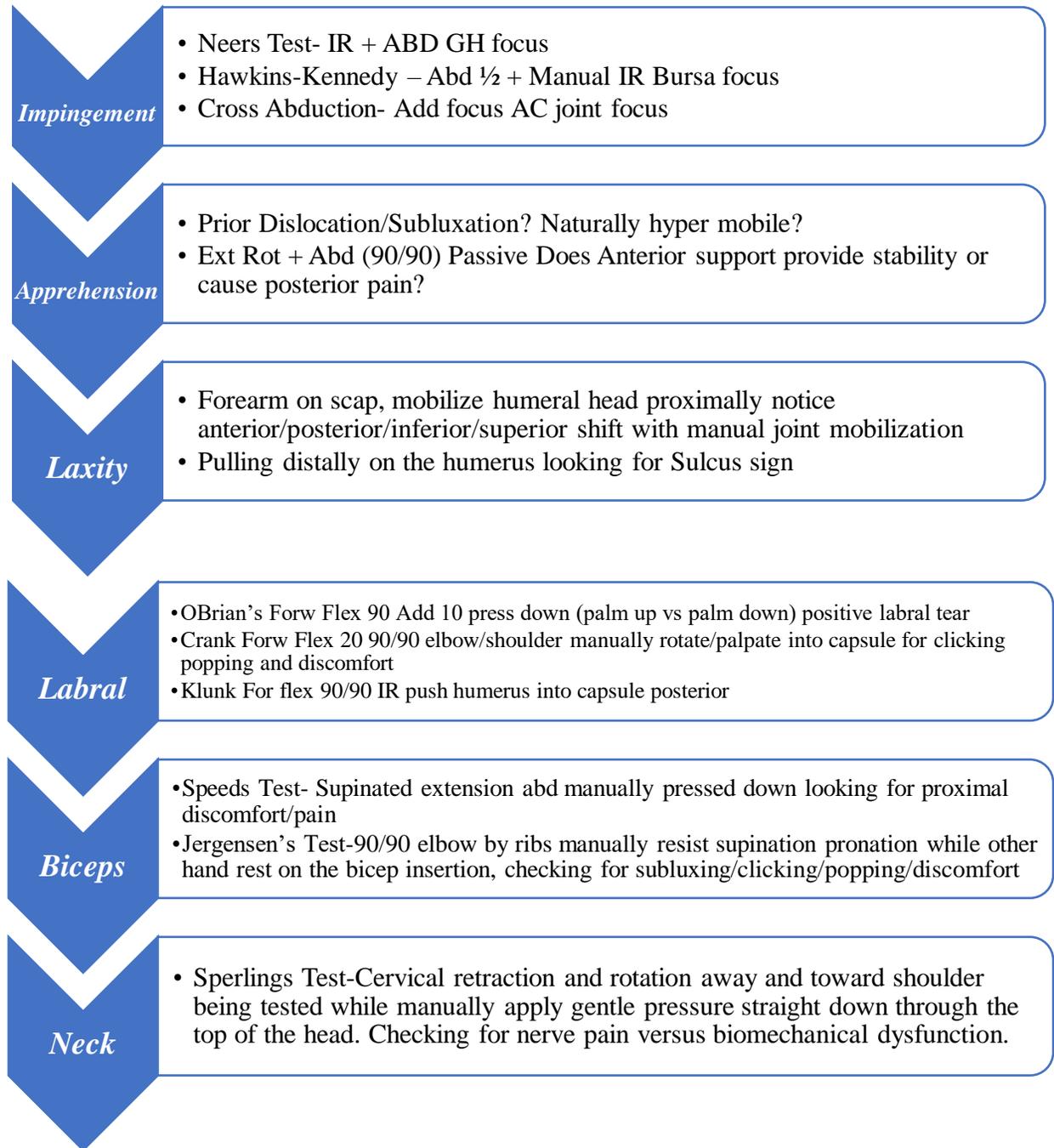
**NOTE:** Image and information provided in chart extracted via Science Direct



Type	Labrum	Biceps Tendon
1	Degeneration	No affect
2	Fraying	Detachment at insertion
3	Bucket handle tear	Intact
4	Bucket handle tear	Avulsion

## A6.) SPECIAL TESTING

**NOTE:** Information provided in chart extracted via Human Kinetics



**A7.) TABLE OF DRILLS FOR THROWERS/OH ATHLETES**

Exercise	Intensity	Volume
CAR Pro/Ret Reach For	Dark Green	Dark Blue
CAR Pro/Ret Reach Lateral		
CAR Pro/Sup Same	Light Green	Dark Blue
CAR Pro/Sup Torque		
CAR 90/90 Ext/Int Rot N	Light Green	Dark Blue
CAR 90/90 Ext/Int Rot Thumb Up/Down		
CAR Alt 90/90 Ext/Int Rot N	Light Green	Dark Blue
CAR Alt 90/90 Ext/Int Rot Thumb Up/Down		
Add Plyo Ball	Light Green	Dark Blue
Plyo Ball Wall Angels w Bounce	Light Green	Dark Blue
Plyo Wall Angels Reverse		
	Yellow	Dark Blue
Mace Halos		
SA Mace Halos	Yellow	Dark Blue
Rot Mace Halos		
SA Rot Mace Halos	Yellow	Dark Blue
Plyo Throw Holds	Yellow	Light Blue
Plyo Reverse Perturbations		
Plyo Rot Throw Behind Perturbation	Yellow	Light Blue
Plyo Reach Perturbation		
Plyo 90/90 Perturbation	Yellow	Light Blue
Plyo Ext/Rot Drop Catches		
Plyo Reverse Throws	Orange	Light Blue
Plyo Rot Throw Behinds		
Plyo Throw Heavy	Red	Light Blue
Plyo Hold Light		

## AS.) TABLE OF SPECIAL TESTING FOR SHOULDERS

As a healthcare professional working in Division – 1 athletics, I often get to see injuries when they initially happen. Witnessing said injuries whether it be macro traumatic or overuse in nature, understanding the mechanism of injury helps me piece together fragments of what the athlete reports to me. Below is a general thought map I follow in my clinical evaluation to find out what is going on and what the injury or injuries might be. This is usually a medical evaluation done before any other functional or systems evaluations are conducted. This type of evaluation usually mirrors an orthopedists’ approach when trying to find the mechanical structures involved that is causing pain and dysfunction. **NOTE:** Info provided below via (26).

### Examination Map/Thought Map

<b>HISTORY</b>
<p><b>Past Medical History</b>  <b>History of Present Condition</b>            Mechanisms of Injury            Onset of Symptoms            Location of Pain</p>
<b>INSPECTION</b>
<p><b>Function Assessment</b>  <b>Inspection of Anterior Structures</b>            Shoulder heights            Head Position            Arm Position            Contour of Clavicle            Visual Examination of the Deltoid Muscles            Humerus</p> <p><b>Inspection of Lateral Structures</b>            Visual Examination of the Deltoid Muscles            Acromion Process            Humeral Position</p> <p><b>Inspection of the Poster Structure</b>            Vertebral Column            Scapular Positioning            Muscle Hypertrophy/Dystrophy/Atrophy            Humeral Position</p>
<b>PALPATION</b>
<p><b>Palpation of the Anterior Structures</b>            Jugular Notch            Sternoclavicular Joint            Clavicular Shaft            Acromion Process            Acromioclavicular Joint            Coracoid Process            Humeral Head            Greater Tuberosity            Lesser Tuberosity            Bicipital Groove            Humeral Shaft            Pectoralis Major &amp; Minor</p>

Coracobrachialis  
Deltoid Muscle Group  
Biceps Brachii (Long Head & Short Head)

**Palpation of Posterior Structures**

Spine of the Scapula  
Superior Angle  
Inferior Angle  
Rotator Cuff (Infraspinatus, Teres Minor, Supraspinatus)  
Teres Major  
Rhomboids  
Levator Scapulae  
Trapezius  
Latissimus Dorsi  
Posterior Deltoid  
Triceps Brachii

**JOINT ASSESSMENT AND MUSCLE FUNCTION TESTING**

**Range of Motion (Can be measured with a Goniometer)**

Flexion  
Extension  
Abduction  
Internal Rotation  
External Rotation  
Horizontal Abduction  
Horizontal Adduction

**Active Range of Motion**

Apley's Scratch Test  
Flexion/Extension  
Abduction/Adduction (Drop Arm Test)  
Internal/External Rotation  
Horizontal Abduction/Adduction

**Manual Muscle Testing**

Gerber Lift-Off Test  
Flexion/Extension  
Abduction/Adduction  
Internal/External Rotation  
Horizontal Abduction/Adduction  
Scapular Muscles

- Retraction and Downward Rotation
- Retraction
- Protraction and Upward Rotation
- Depression and Retraction
- Elevation

**Passive Range of Motion**

Flexion  
Extension  
Abduction  
Adduction  
Internal Rotation  
External Rotation  
Horizontal Abduction/Adduction

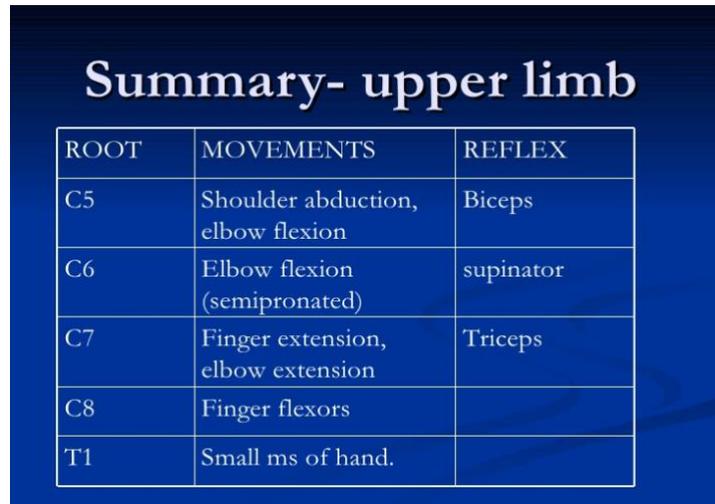
## JOINT STABILITY TESTING

### Joint Play

Sternoclavicular Joint  
Acromioclavicular Joint  
Glenohumeral Joint

## NEUROLOGICAL EXAMINATION

Upper Quarter Screen



A blue background slide with the title "Summary- upper limb" in white serif font. Below the title is a white-bordered table with three columns: ROOT, MOVEMENTS, and REFLEX. The table lists nerve roots C5, C6, C7, C8, and T1, their associated movements, and reflexes.

ROOT	MOVEMENTS	REFLEX
C5	Shoulder abduction, elbow flexion	Biceps
C6	Elbow flexion (semipronated)	supinator
C7	Finger extension, elbow extension	Triceps
C8	Finger flexors	
T1	Small ms of hand.	

## PATHOLOGIES AND SPECIAL TESTING

### Sternoclavicular Joint

#### Acromioclavicular Joint

Acromioclavicular Traction Test  
Acromioclavicular Compression Test

#### Glenohumeral Joint

##### Anterior Instability

- Anterior Apprehension Test
- Relocation Test
- Anterior Release Test

##### Posterior Instability

- Posterior Apprehension Test
- Jerk Test

##### Inferior Instability

- Sulcus Sign

##### Multidirectional Instability

- Load and Shift Test
- Kim Test

#### Rotator Cuff Pathology

Impingement Syndrome  
Neers Impingement Test

<p>Hawkins Kennedy Impingement Test</p> <p>Drop Arm Test</p> <p>Rotator Cuff Tendinopathy</p> <ul style="list-style-type: none"> <li>- Drop Arm Test</li> <li>- Empty Can Test</li> </ul> <p>Subacromial Bursitis</p> <p><b>Biceps Tendon Pathology</b></p> <p>Bicipital Tendinopathy</p> <ul style="list-style-type: none"> <li>- Yorgason’s Test</li> <li>- Speeds Test</li> </ul> <p><b>SLAP Lesions</b></p> <ul style="list-style-type: none"> <li>- Active Compression Test</li> <li>- Anterior Slide Test</li> <li>- Compression-rotation Test</li> <li>- Slaprehension test (combination or tension testing and sulcus sign)</li> </ul> <p><b>Other Labral Pathologies</b></p> <ul style="list-style-type: none"> <li>- Clunk/ Crank Test</li> <li>- Labral Pinch Test</li> <li>- O’Brien’s Test</li> </ul>
--

This table allows you to have a very general schematic in your head when assessing the shoulder complex. It is very important to also consider the joint above (cervical spine) and joint below (elbow) when screening the shoulder joint.

**Questions to ask**

1. What is the diagnosis?
2. What is the definitive diagnosis based off physician’s assessment and confirmation via imaging or diagnostic test?
3. What is the differential diagnosis’?
4. What is the athlete’s past injury history to the shoulder complex or the joints above and below?
5. Based off what we know from the top 4 questions, what structures are most likely involved?
6. What movements and contractions are painful and what aren’t?
7. What has that athlete done themselves to fix the problem or symptoms?
8. What is the end goal aside from the obvious? (return to sport, return to occupation, competition, return to daily activity, return to a minimal point of function)

**CERVICAL SPINE SPECIAL TESTS TO RULE OUT:**

With shoulder pain it is also wise to rule out the possibility of pain generators originating from the neck due to radiculopathy, intervertebral disc lesions, or circulation pathology:

<b>Radiculopathy Tests</b>	<b>Intervertebral Disc</b>	<b>Brachial Plexus Tests</b>	<b>Thoracic Outlet</b>
-Cervical compression test -Spurling’s test -Cervical distraction (pain alleviation is a positive test) -Vertebral artery test	-Shoulder abduction test -Valsalva maneuver	-Brachial plexus traction test (stingers/ burners) -Degenerative joint -Cervical Instability -Facet joint dysfunction	-Adson’s test -Allen test -Costoclavicular syndrome test -Roos test

## REFERENCES

- 1.) Aasa U, Svartholm I, Andersson F., 2017. Injuries among weightlifters and powerlifters: a systematic review. *British Journal of Sports Medicine*,51:211-219.
- 2.) Ackland, DC. Pandy, MG., 2009. Lines of action and stabilizing potential of the shoulder musculature. *J Anat*, 215,184-197.
- 3.) Amoako, AO. Pujalte, GG., 2014. Osteoarthritis in young, active, and athletic individuals. *Clinical Med Insights*,7:27-32.
- 4.) Andrews, R. Zarins, B. Wilk KE (eds): Injuries in Baseball. Philadelphia: Lippincott-Raven, 1998. Pg 452-453.
- 5.) Baechle, TR. Earle, RW., (2008). **Essentials of Strength Training and Conditioning (4<sup>th</sup> ed.)**. Champaign, IL: Human Kinetics.
- 6.) Bayattork, M. Seidi, F. Minoonejad, H. McClure, P. Mozafaripoor, E.,2019. Intra-rater and inter-rater reliability and agreement of the scapular dyskinesis test in young men with forward head and round shoulder posture. *JRSR*,6(4):169-173.
- 7.) Cressey, E. [Sturdy Shoulders](#)
- 8.) Helgadottir, H. Kristjansson, E. Mottram, S. Karduna, A. Jonsson, H., 2011. Altered alignment of the shoulder girdle and cervical spine in patients with insidious onset neck pain and whiplash-associated disorder. *J Appl Bio*, 27:181-191.
- 9.) Howe, LP. Blagrove, RC., 2015. Shoulder function during overhead lifting tasks: implications for screening athletes. *J Str Con Res*,37(5):84-93.
- 10.) Laudner, K. Wong, R. Latal, J. Meister, K., 2020. Posterior shoulder tightness and subacromial impingement characteristics in baseball pitchers. *Intl J Sport Phys Ther*,15(2):188-195.
- 11.) Lee, KS., 2020. Effect of a five-week scapular correction exercise in patients with chronic mechanical neck pain. *J Kor Phys Ther*,32(2):126-131.
- 12.) Lefevre-Colau, MM. Nguyen, C. Palazzo, C., 2017. Recent advances in kinematics of the shoulder complex. *Phys Rehab and Med*,61:56-59.
- 13.) Lin, J. Lim, HK. Yang, J., 2005. Effect of shoulder tightness on glenohumeral translation, scapular kinematics and scapulohumeral rhythm in subjects with stiff shoulders. *J Orthop Res*, 24:1044-1051
- 14.) Ludewig, PM. Reynolds, JF., 2009. The association of scapular kinematics and glenohumeral joint pathologies. *J Orthop Sports Phys Ther*, 39(2):90-104.

15.) Massimini, DF. Boyer, PJ. Papannagari, R. Gill, TJ. Warner, JP. Li, G., 2012. In-vivo glenohumeral translation and ligament elongation during abduction and abduction with internal and external rotation. *J Orthop Surg Res*,7:29.

16.) Meyers, T.W., (2009). **Anatomy Trains (2<sup>nd</sup> ed.)**. New York, New York: Elsevier Limited

17.) Mitchell, K. Banks, S. Morgan, D. Sugaya, H., 2003. Shoulder motions during the golf swing in male amateur golfers. *J Orthop Sports Phys Ther*, 33(4):196-203.

18.) Parisi, B. **Fascia Training: A Whole-System Approach**. New Jersey: Independent Publisher

Physiopedia- (19) [Biomechanics](#) /(20) [Rotator Cuff](#) /(21) [Scapula](#) /(22) [Subacromial Pain](#)

23.) Spranz, DM. Bruttel, H. Eckerle, JM. Wolf, SI. Berrsche, G. Maier, MW., 2019. Variation of the glenohumeral and scapulothoracic motion in progressive severity of glenohumeral osteoarthritis. *OTSR*,23(75).

24.) Starkey, C. Brown, SD. Ryan, J (eds): Examination of Orthopedic and Athletic Injuries, edition 3: F.A. Davis Company, 2009. Pg 628-630

25.) Storey, A., Smith, H.K., 2012. Unique aspects of competitive weightlifting. *Sports Med* 42, 769–790. <https://doi.org/10.1007/BF03262294>

26.) Tachihara, H. Hamada, J., 2019. Characteristic movement of the ribs, thoracic vertebrae while elevating the upper limbs- influences of age and gender on movements. *J Open Ortho*,13:170-176.

27.) Teyhen DS et al., 2008. Rotator cuff fatigue and glenohumeral kinematics in participants without shoulder dysfunction. *J Athl Train*, 43(4):352-8.

28.) Umehara J., 2018. Scapular kinematic and shoulder muscle activity alterations after serratus anterior muscle fatigue. *J Shoulder Elbow Surg*.

29.) Umehara, J. Yagi, M. Hirono, T. Komamura, T. Nishishita, S. Ichihashi, N., 2019. Relationships between scapular initial position and scapular movement during dynamic motions. *PLoS ONE*.14(12).

30.) Vangsness Jr, TC. Jorgenson, SS. Watson, T. Johnson, DL., 1994. The origin of the long head of the biceps from the scapula and glenoid labrum. *J Bone Joint Surg*,76:951-954.

31.) Woertler, K. Waldt, S., 2006. MR imaging in sports-related glenohumeral instability. *Eur Radiol*,16:2622-2636.