

### ICSC06 Upper Extremity Module 6

#### Part 4 - Shoulder Functional Assessment Rehab

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Video Lesson: 1:29:11 Hour/minutes

Welcome back to part two of the ICSC: Shoulder Conditions and Rehabilitation. We continued on this next part into looking at and discussing shoulder functional assessment and rehabilitation. Our outline for the next 60 to 90 minutes looks like this. We will be discussing functional assessment and you will see this term tiers one through five if my mouse is moving on the screen here for you. That concept of tiers one through five basically talks about a progression, a progression of functional assessment. Within that progression of functional assessment, we are going to be talking about some outcome forms at a very, very high level. Many of you have these outcome forms in your clinical environment.

We talk about posture, at a very high level and some functional assessments. Things that you can consider utilizing in your office to quantify function or lack of function. Then we are going to spend most of our time probably discussing physical rehabilitation. We have these tiers one through five, it is a progression that I view for a long time, teaching it for a long time and have a couple of publications based on this process. There is some peer review evidence supporting these progressions, which just summarize each tier.

The first tier we talk about Removing the Negatives. It may be negative is the wrong word, maybe we can talk about removing hurdles that might prevent your patient from progressing appropriately in a rehabilitation program. So those are some of the first things that we want to address. Then secondly, the second tier, discussing Static Stabilization and implementing some sort of cardiovascular exercise. We will tackle a little bit deeper into each of these as we progress on. The third tier would be discussing Dynamic Stabilization. We will discuss and explain how Static Stabilization differs from Dynamic Stabilization, how these exercises differ. Then the fourth phase would be Mobilizer Conditioning. That is the term I prefer to use versus strengthening. I think the term "strengthening" is misused too much within the rehabilitation field and we'll discuss that too as we go on. So, Mobilizer Conditioning would be that fourth phase. Then the fifth phase: Activities of Daily Living. We are working primarily with athletes, so we want to assure that we are returning the athlete back to their activities during their sport. Whether they are a power sport, a strength sport, or a speed and agility sport. We want to make sure that they can return to those activities in a safe and effective manner.

These tiers are based on a couple of pyramids that we published. You can see the pyramid being referenced in these articles that we published back in the mid-2000s, 2006-2007. The pyramid is simply just a learning tool like the nutrition pyramid years ago. I realized we do not use the nutrition pyramid much anymore, but the pyramid was a nice device basically to teach my patients, as well as teach my Chiropractic students how to implement a progressive rehabilitation program. This is one of the pyramids that we have published. If you look at the top, you can see that it is a Pyramid for Functional Assessment. If you look on the outside of the pyramid, we talk about outcome assessments. Outcome assessments and these are assessments on which you put a number on.

Most often you think about a subjective outcome assessment. A piece of paper that a patient fills out and answers particular questions. With that, each question has a particular number pertaining to it, and you end up with a total. Not all outcome assessments have to be paper. I want you to consider all your assessments, whether it is a hand on assessment or a paper assessment, trying to put some sort of quantified number on them.

Then on the other side of the pyramid, we talk about motor control deficits. Throughout the entire assessment process of your patient, you are going to be trying to identify whether they have some sort of aberrant movement pattern or motor control deficit. Then you can see in the center we have these different

tiers if you will. Tier one, tier two, tier three, four, and five. One of the negative comments I received on my papers when I was submitting them through peer review was that the tiers themselves are rather wordy. Sure, that is fine, I get that. What I tried to do was simplify it a little bit and we will show you what I mean by that. Tier one is the least invasive thing that we can do to functionally assess our patients. Then tier two would be the next invasive. As we get up to and progress onto such as tier four, we are starting to ask our athlete to do some pretty aggressive things, such as jump as far as you can or as high as you can or throw this medicine ball as far as you can. Clearly, if we were starting a rehabilitation program for a patient, we would not start there.

You can understand that we would progress from least invasive to most invasive. So let us talk about the first thing that we are going to be doing. The first thing we are going to be considering with our patients is basically observing them and palpating them or looking at touching to simplify things. Then we are going to ask the patient to move, but we are going to ask them to move without any load. We are going to give you examples of these as we proceed on. We are going to ask them to move without any load, such as a Gait analysis or going through a range of motion, or some sort of orthopedic evaluation.

Then the third tier is asking the patient to maybe move with some light sustained load, or contract with a light sustained load, or a brief heavy load such as a manual muscle test or a handheld dynamometry test. The fourth one, I gave some examples already, we are going to be possibly performing some fitness testing, maybe sprint to 40 meters, throw a medicine ball, Max testing, one rep max or ten rep max testing. The last thing we want to do is perform a reassessment. The fifth tier is basically just a reminder of how important it is to reassess your patients on a regular basis. We will talk about a study by Han back in 2004 and what he found. This particular functional assessment goes from least invasive to most invasive, so let us look at some of these examples.

In tier one, the least invasive thing that we want to do is basically just look at your patient. Try to identify whether there are some clinical indications for some somatic or neurologic or other physiologic problems. We saw this individual in part one lecture if you remember, we anticipated that he probably has a bit of scoliosis because of the number skin fold are varied on one side versus the other. The difference between his arms was different, his right shoulder a little bit lower. We also pointed out some atrophy in his right Infraspinatus area. So that is just to remind you a little bit of what we found and discussed in part one lecturer. Some of the things from a functional assessment perspective, that we did not discuss earlier was looking at the breathing pattern. Do they have a paradoxical breathing pattern? We know that if a patient does suffer from a paradoxical breathing pattern that is rather inefficient. They spend extra energy trying to breathe and it may result in chronic pain. So that is something to consider.

Faulty mechanics, we want to identify faulty mechanics. What I mean by this, especially talking to sports chiropractors, would be more of your motion palpation assessment, trying to identify joint average function, maybe some capsular contractor, for example. Then some sort of static posture findings. This individual has a little bit of a right lower shoulder so we can maybe assume. Then his cervical spine is compensating pretty well so we can maybe assume that maybe the left upper trapezius muscles are a little bit shorter than his right side, hence identifying length and tissues versus some shortened tissues. Therefore, if we know that, we know that maybe it might be contributing to the patient's shoulder symptoms and we can implement some sort of soft tissue therapy once we start discussing and putting together a treatment plan, so that is tier one.

Moving on to tier two. The next more invasive section of the functional assessment would be asking the patient to move without any load. Range of motion clearly is a fit within that description. My preference is to perform active range of motion first in almost every physical exam book that I have ever looked at. It talks about asking the patient to be active with their range of motion first so that they can stop if it hurts. Then

after they have done their active range of motion, all the ranges, then to perform passive range of motion. I think the most important component of passive range of motion is applying that little bit of overpressure so that we can identify if that endpoint is bone on bone or if it is tissue stretch. If it causes increased pain for a patient. I like Apley's Scratch Test or Apley's Test Range of Motion- test for the shoulder. I put that into almost a range of motion assessment because it is now combining different planes of range of motion for the shoulder. We recall that Apley's includes three different components of testing reaching out the back, as we can see in the mirror, reaching over the opposite shoulder, and then down the back if they can, and then reaching over the ipsilateral shoulder and down the back if they can. We can see all this in the mirror.

You can see the provider as well, marking or making notes where their fingertips are touching on that spine level. I have been teaching for a fair amount of time, and I have been teaching all over the world. I see students doing different things in regard to this Apley's Scratch Test, and I will see if I can demonstrate this, I see a lot of students doing both hands at the same time. In other words, if we look at this picture on the left-hand side, her right arm would be reaching her upper back and her left arm would be reaching over the same shoulders, same shoulder ipsilateral shoulder trying to touch their fingers.

I am not a fan of doing Apley's in that particular manner. I think there is just too much going on. Yes, it is faster but when we are losing quality of testing, I would rather take a little bit of extra time and do it slower. I do one arm at a time and discourage my students from doing two arms at a time. If that works out really well for you, continue on, but I just want you to think about that a little bit more.

One thing that also a lot of orthopedic textbooks do not discuss when discussing Apley's is watching what the scapula does during this test. Especially when we are asking the patient to internally rotate the glenohumeral joint and extend and abduct the glenohumeral joint. What often happens is if that posterior capsule of the glenohumeral joint is tight, the scapula tends to tip anteriorly. We can see sometimes anterior tipping or winging of the scapula. Sometimes a medial border is rather prominent when we have them perform this maneuver. Be sure to make note of that. It is one thing to note how far their fingers are reaching up their spine. It is a second thing and very important thing to know how much scapular movement there is or winging as compared to the opposite side. That is why I like to do just one hand at a time.

In regard to testing internal rotation of the glenohumeral joint and identifying whether the glenohumeral capsule, particularly the posterior capsule, is potentially aberrantly tight. I like to perform an internal rotation assessment of the glenohumeral joint and compare from left side or right side. I have seen this done several times and started doing this many years ago. Started teaching it to sports chiropractors and chiropractic students, and then IASTM technique since 2004. Teaching medical doctors and physical therapists and osteopaths how I performed this internal rotation assessment. It is different from what everybody else seems to have been taught. They tend to perform this test supine rather than prone.

As you can see in the picture, they perform at supine. Otherwise, they do everything the same. My frustration is I do not really know what the scapula is doing when the patient is supine. When I put the patient prone, I can keep a finger on the scapula and identify what is going on with the scapula.

### **Let us watch this video.**

What we are going to be doing is lying the patient prone. We are going to position the elbow so that it is at the height of the glenohumeral joint. I apologize, my internet is really slow here in the country, so I hope this is going to work better for you. But with my left hand, I am going to palpate the inferior angle of the scapula. While I am palpating the inferior angle of the scapula, I am internally rotating the humerus. Once I feel that the inferior angle is just starting to lift off the rib cage, I take my inclinometer and I place it on the forearm, a consistent spot on the forearm, and identify that angle of the forearm. Let us play that again and watch what is going on here.

I position the glenohumeral joint at 90 degrees of abduction, placing the elbow at the height of the glenohumeral joint. I internally rotate the glenohumeral joint just until the inferior angle of the scapula starts to lift off. Hold the humerus or the humerus in that position, and then grab my inclinometer and measure the antebrachium or the forearm at that particular angle. Then I compare it to the other side. What I commonly see is if this individual was winging on that side of when we are doing posture testing, if they wing on that side or during Apley's, eight times out of ten, almost 100% of the time. Probably being conservative with 80%, almost 100% of the time I see a reduced internal rotation of glenohumeral joint. I am assuming that is posterior capsule tightness because when I go to motion palpate and glide the humerus posteriorly, there seems to be a restriction on that side compared to the other side.

Another tier two consideration is looking at scapular rhythm. We can look at scapular rhythm from a static perspective and a dynamic perspective. Statically, when we look at scapula statically what we are looking at is the distance from the medial border of the scapula which I have a little red dot here to the spinal process of the spine and then we compare it to the other side. It makes sense that for the most part, these two sides should be pretty similar in distance. When we measure both of these, if one side is significantly larger than the other, we can assume maybe that there are some motor issues, some muscle imbalances. Then also we want to watch the scapula move as we bring them into more of a dynamic movement.

Looking at dynamic scapular rhythm we want to watch the medial borders laterally rotate and biomechanics textbooks are different. For the most part, once the humerus starts to abduct, and I think we talked about this earlier in part one lecture, the scapula really should not move. It is not until the humerus gets out to about 15 to 30 degrees depending on what reference you read, that is when the scapula starts too laterally rotate or upper rotate. This kinesis that we are trying to identify is really important. When we talk about shoulder injury mitigation or shoulder injury prevention, scapular dyskinesis seems to be one of these things that we want to identify. We will talk about a study here later in this presentation. But let us look at an aberrant movement and some scapular dyskinesis.

### **Video Placement: 17:08**

What we are going to see in this video, is one of the shoulders is going to abduct just fine as we can see on the left and when he is trying to abduct on his right side, we see him hiking his shoulder.

In other words, early firing may be of the upper trapezius, maybe we can call it those levator scapulae. We can also maybe think that maybe there is poor centration of the glenohumeral joint, things that we need to investigate further or make some predictions basically by looking at this. We can maybe make some assumptions that the inferior trap and the serratus anterior and maybe latissimus dorsi, to some degree, are not working quite as well, also may be a little delayed in firing because the upper turrent trap might be firing a little bit early and causing this hiking of the right shoulder. We call this a reversed glenohumeral rhythm. A reversed glenohumeral rhythm, common in some of our injured rotator cuff patients and our early signs of adhesive capsulitis.

This is a young lady that we saw in part one lecture. If you recall clearly, she has scattered dyskinesis. This was a paper that we published quite a few years ago and if you go to this link, you will see not just this video, but you will see X-rays, you will see the entire case. You also see a fluoroscopy of this case, and the fluoroscopy is pretty cool. The fluoroscopy basically shows four repetitions of her dyskinetic shoulder. Then she co-contracts. Remember, in part one lecture we talked about co-contracting causing centration of the glenohumeral joint and centration of the scapula thoracic complex.

Normalizing in her case, normalizing her glenohumeral rhythm and her scapula rhythm. With her right shoulder, we realized that she had normal, good, healthy, full range of motion. When she did it on her left, it was very disconnected and clunky, if you will. Then she co-contracted and she had a nice healthy rhythm. This is an important component for me to determine whether a patient is going to be a really good rehabilitation patient. If the patient can co-contrast and following co-contraction, their pain decreases or their neuromotor control and their motor pattern improves. I think in my book and from my experience, the patient is going to be a really good rehabilitation patient.

We have covered a few different things to consider in tier two. Tier two is movement, but no load. Real simple things, some orthopedic tests, and range of motion and maybe a range of motion with co-contraction. Here is another simple, low-tech, low-cost assessment that you can quantify. It is called the Upper Body Flexibility Test, and this was from a peer-reviewed manuscript, I have the manuscript reference here. Just to standardize things, they suggested you place the patient's heels 45 centimeters away from the wall, and their heels 35 centimeters apart. What I noticed is when I have got some of my children or my shorter people doing this test, 45 centimeters is a long way. What I did to try to standardize it was to try to have the hips roughly about 30 degrees angle from the wall. 45 again, 45 centimeters might be just too far or maybe not far enough for some of our longer athletes.

Nonetheless, I have my patients relatively in this position. I also made one change from the standardized, from the publication. I noticed that if my patients had their arms apart, and you can see that basically, the premise of the test is to raise her arms up over her head and reach as far as she can. I notice that as they reach up above their head, they started bringing their arms further and further and further apart, basically cheating. One change I made, and you can pause this video and have a real quick practice, is to put your thumbs together.

I asked the patient to put their thumbs together right at their hips with their elbows straight, and they have to keep their elbow straight throughout this entire test. With their thumb still touching each other. They have to go up over their head as far as they can. They could not separate their thumbs and they could not bend their elbows. I found that to be far more consistent and I was able to standardize it more effectively.

Here is how we quantify this. It is on a scale of zero to two. If the patient is able to go all the way up and go flat handed on the wall without arching her back. You can see if she is arching her back a little bit, but we do not want them to arch their back but you can see that she had to in order to go flat handed. If the patient is able to maintain their back and their head against the wall, keep their thumbs together and go flat handed on the wall, that is a two. If they cannot quite reach the back or the wall behind them with the back of their hands. But if they extend their wrist, as you can see in the picture, and touch their fingertips, then they get one point. If they extend their wrist and still cannot touch their fingertips, then they score a zero. What I always ask my athlete is if they score a zero or one, why cannot they go further? What is stopping them? Surprisingly, the most common response I get from my athletes is I feel a pinch in my thoracolumbar junction, which was kind of surprising.

We are going to talk about a paper later that might help us understand that. What I commonly do when it comes time to treat is I clearly look at that TL junction and again, there is a CMT, a chiropractic manipulative therapy paper that we will talk about. I almost adjust everybody's TL junction if there is a restriction there when I have a patient coming with a shoulder complaint. But nonetheless, I tend to adjust that and before they leave, I retest. In the retesting, surprisingly, and maybe not too surprisingly, they do much better on this test. If they are able to do better or perform better on this test, great. Sometimes they complain of shoulder pinching or tightness in their neck. Then we are going to look in those particular areas.

Let us just review this. Thumbs together, right in front of the pelvis, elbow straight, reach out their head up over their head as far as they can. If they cannot touch with extended wrists, it is a zero. If they can touch their fingertips with an extended wrist, it is a point of one. If they can go flat handed, it is a point of two.

Another simple test that allows us to quantify and measure proprioception, it is utilizing a pretty well-studied measurement now, or intervention called Angle Recreation. We are just trying to recreate an angle that we had the patient assume earlier in the test. So let us play it as a video here. This is from a peer-reviewed study, and they found that there were good outcomes. What we are going to do is ask this patient to sit, close his eyes, hold his arm in a particular position. You can see she is got a digital inclinometer measuring the angle. We are going to ask the athlete to fully extend and fully internally rotate. Then try to recreate that same starting angle. When it comes to that same starting angle and he feels like he is in a pretty same spot, the doctor, the provider is going to go back in and measure again. What we are finding is, in regard to clinical relevance.

If they are consistently off by ten degrees, that might be clinically relevant. More than ten degrees consistently might be clinically relevant. We are going to compare left side to right side. Oftentimes a symptomatic shoulder does seem to be consistently more than ten degrees off when recreating this. We are asking him to start with a specific angle that we have already measured. We are going to have him fully, externally rotate, fully internally rotate as far as it does not matter. Which do you do first, internal or external? Does not matter. Then you come back to that same angle recreation position, and you remeasure.

We are now moving into Tier Three Assessment, we are going to apply a light sustained load or a heavy, brief load. Regarding a light sustained load, what I tend to look at is looking at scapular stability. We can have the patient assume what is called a 4-point position, many of you might be familiar with this. When the patients in this 4-point position, just a little bit of weights on this closed chain shoulder, the scapula might tend to wing a little bit, and then same thing.

If the patient is unable to assume this 4-point position, a less aggressive position might be just to do a push-up position. A position of performing a push-up on the wall. With these top two pictures, you can see that is what she is doing. When she assumes a little bit of load on her shoulder complex, in a closed chain position, you can see that both scapula wing just a little bit, but her right shoulder is a bit more significant. Then we thought, well, let us put a little bit more load on and see what we can find. We did put her in the 4-point position with these two pictures, and you can see clearly that her right scapula does wing a bit more than her left side.

Knowing that co-contraction of a shoulder complex might improve motor control deficits or motor coordination. Maybe decrease pain and improve function of range of motion, do you think it pays and makes sense to have the patient co-contrast doing this test? Then retest them and see if the scapular control is improved. This individual, was a high-performance swimmer, which was one of my students. He was a high-performance swimmer. You may have heard the name Michael Phelps, a really good multi-medal swimmer for USA in the Olympics. This individual that we are looking at here has been in the pool with Michael Phelps and has competed in similar races as Michael Phelps. We clearly appreciate that swimmers need a significant functional range of their shoulder complex in order to perform their sport. It might not be too surprising that this individual, when placed in a light sustained load position in a closed chain position, that we saw this much scapular winging. What makes me feel good, if anything, is that it is symmetric. But it does concern me that I am curious.

With his range of motion, he actually had a good range of motion. There was not any disc easier, so that is important. But I do believe that if he does not have the motor control to stabilize the scapula to the rib cage, that he could be predisposed and we will talk about a study later as well. He could be predisposed to a more significant shoulder injury. So here is what we did. We put a light sustained load on him, and this is what we

found. As you can see initially in this picture, his hips are over his knees and so he is leaning forward. There is a little bit more, more load on his shoulders. What we asked him to do was lean back and take the load off his shoulders. Then we taught him how to co-contract his shoulder complex by putting our thumb in his axilla, putting our fingers on the posterior scapula, giving a little bit of a squeeze, and asking him if he can contract these muscles. That is a crude description. If you need more information and videos or whatever, just reach out to me. But what we want him to be able to contract is subscapularis posterior shoulder muscles, including mid trap, low trap, and rotator cuff muscles. The pec minor should be contracting a little bit, but the upper trapezia should be turning off.

Once we have him actively co-contractor shoulder complex, then we had him lean forward. Once he leaned forward, similar to the first position, you can see that the amount of scapular winging was significantly less. In my mind, this patient is a great rehabilitation patient. Now the question is, he is no longer swimming at a highly competitive intensity. My question and concern as a sports medicine person, sports chiropractic person, would be if I taught him how to co-contract effectively at his shoulder, would it potentially diminish his productivity in the pool?

That is clearly not what we want to do for a high-performing athletes. But to some degree, you might want to improve it a little bit. That is a bit of the art of being a sports doctor, is understanding what might be appropriate for the right patient. An example of a heavy, brief load for tier three. In other words, manual muscle testing or using a handheld dynamometer. We talked a little bit about this in part one lecture. This is a paper that a systematic review that myself and Dr. Renee Fejer and Bruce Walker published in 2011. Systematic reviews are very complicated, it took about two and a half years to publish this paper. But nonetheless, I use handheld anemometry quite a bit and it helps me quantify whether there is a difference between the left side and the right side for a particular movement. I do not feel like I test specific muscles, I feel like I am testing movement. For example, the upper right, I am testing resisted abduction at 90 degrees. Here I am testing resisted external rotation, again in 90 degrees of abduction, and resisted internal rotation in 90 degrees abduction. Here is resisted internal rotation while the glenohumeral joint is more in a neutral position and so on. I think serratus anterior strength is important, but neural-motor control, is even more important for the scapula. In fact, when we look back at this previous case that we just discussed with all the scapular winging, I am sure some of you are thinking, wow, his scapular interior is really weak, and we need to strengthen it. I do not think that it is a weak, using the words strength and weak, I think we use them incorrectly. In order to say that it is a weak, we actually need to muscle test it, so this is one of many positions in which we can test the strength of serratus anterior against a heavy load in a unidirectional pivot vector. That is the definition of strength testing. You cannot do a light sustained load and claim your testing strength, you may be testing motor endurance at that point. To test strength, that needs to be a higher resistance and mostly in a unidirectional state, such as in this position. I have noticed a lot of people like this individual, his serratus anterior is ridiculously strong when I muscle tested him. It was just at the serratus anterior and other muscle structures. Just did not know what it was supposed to do. It was strong, but it was stupid, and did not clearly understand that it needed to stabilize the scapula to the rib cage. That was tier three, light sustained load and heavy brief load.

### **Let us talk about Tier Four which we briefly and affectionately called it Fitness and Maximum Testing.**

There is a lot of fitness and maximum tests that we can do. One of them would be muscle endurance test. If you just simply Google standardized muscle tests for motor endurance or muscle endurance, push-ups is clearly going to be one of those tests that you are going to see. Depending on the standardized data collected, you want to perform the push-up the way the data has been collected for the group of that study. So oftentimes what you see is males will be in a toe and hand position, whereas women might be more in a knee and hand position. Then they perform push-ups in a particular manner. Sometimes, depending on the standardized test, they will perform push ups until they fail. Sometimes it will be a maximum number of

push ups in 30 seconds or 60 seconds. Sometimes the standardized tests are just performed up to 75 push-ups and then you are done. If you do, you have performed excellently. So be sure to look at the parameters of the standardized test that you choose to use. I like testing for power on almost all of my athletes and using a medicine ball can be really simple. Look at the standards and the description of the standardized test that you are looking at. Medicine ball throws can vary quite a bit. From throwing it forward, from throwing it over your head backward, from taking three steps.

This is an example where my athlete took three steps before she threw the ball. As you can imagine, that can be rather complicated to make sure you are taking three steps in time and everything just right. But this is an example of a YouTube where if you want to look at it and just pause the video and open up another window. But you can see where it is a standardized way of testing power by utilizing a medicine ball throw. The last thing with our assessment pyramid is to reassess. I mentioned that reassessing is really important. The question really is when do we reassess? Well, there is no wrong answer. You can reassess in the same visit, the first and the same visit, which I think is important that we do that you can reassess each visit they come back, and again, I think that is really important. Or to do periodic testing, maybe weekly, every two weeks, every month. But be sure to make sure that you are reassessing on discharge to assure that whatever positive tests that you found initially have now been improved.

The reason why I like to assess frequently and within every visit is from the study that I found in 2004, quite a few years ago by Han. Han found that intrasession, within the same session, reassessment was shown to predict intercession improvement. Intercession improvement, in other words, is the patient going to continue to improve after that first visit? They found that if I treated somebody on a Monday and before they left on my Monday appointment, they had already improved. Maybe their range of motion or their pain went from an eight down to a four. If they improved in that same visit, they were three and a half times more likely to continue to improve until I saw them on Wednesday or Friday or later that week. I think it is really powerful for a number of reasons to test that patient before they leave. One, if it is improved again, we know that the therapy was beneficial and the patient's likely to continue to improve. But I think it provides and lends credibility to what you did to the patient, and the patient can leave knowing they already improved. Sometimes it is just a strength improvement. That is why I use handheld dynamometry, is I can show the patient the numbers on the LCD screen. I can show the patient the numbers showing them that they improve by 20% on the one side when they were clinically positive.

What can we do with this assessment information? What does it mean? Can we use this assessment information to help us determine whether a patient is going to be injured at a later time? Maybe we can, maybe we can't. In this particular study from 2018, a systematic review showed that when evaluating overhead athletes, there were really no modifiable measures that were predictive in preventing shoulder injuries of these overhead athletes. That bothers me. I like to think that there is got to be something in the exam that I can see or test that might predispose a patient to injury. If I can mitigate that or make changes, positive changes, that maybe I can prevent an injury to this athlete. With a systematic review, we clearly have to give that some acclaim and give us some respect. But I did find a paper in 2015, it was before the systematic review, but interestingly, the systematic review looks at overhead athletes and looking at ways of preventing shoulder injuries or identifying predictors of injuries of the shoulder. Interestingly, I looked at the systematic review and looked at all the papers they included in the review. They did not include this paper from Cools, for whatever reason. Maybe they just did not look at the Brazilian Journal of Physiotherapy within their search. Interestingly, this particular paper in 2015 did find some possible predictors for shoulder injuries and I thought it was important. The three predictors that they found were decreased glenohumeral internal rotation. Now you know how to not only test for it if you did not know about it before, but also quantifiably test for it. Performing, placing the patient in a prone position, internally rotating the glenohumeral joint, as we demonstrated in an earlier video. If you need to go back and review that video,

please do so. Diminished internal rotation and keep these three things in mind because we are going to be coming back to these as we go through rehabilitation discussions.

The second thing they found was rotator cuff strength using a handheld dynamometer. Quantifying that strength, especially when testing an external rotation, seem to be a possible predictor for shoulder injuries. Then scapular dyskinesis. We have seen some videos of some multiple patients with scapular dyskinesis. We know that if we have them co-contract when going through that range of motion or when performing a slight light sustained load, that their scapular dyskinesis might improve. We will get into the rehab components of that here in a bit. But keep these three things in mind, reflect back on what we just discussed in regard to assessment and then we will move forward and talk about rehabilitation. But before we move on, it seems like we have got some conflicting evidence here and that is how I would basically respond to a coach, a parent, or an athlete in that when they ask you, can injuries be prevented? In particular, overhead athletes, we can say there is conflicting evidence. One systematic review shows that there does not seem to be any modifiable means of preventing injuries. Although there does seem to be some evidence to show that if we consider three key things of shoulder function that maybe we can possibly prevent some shoulder injuries. I think there are things that we can do, and I tend to lean towards that way. I guess I want to be optimistic that we can benefit our patients from a strength conditioning perspective.

When we start talking about rehabilitation, this paper I thought was pretty interesting because this study when talking about rehabilitation, which looked at a number of different considerations. They look at passive interventions, such as just injecting attendants, performing strength training, and these are all different groups. One group just had a passive intervention and that is it. One group had strength training and that is it. One group had motor control and that is it, and one group had everything.

This group that only had passive intervention, they did not have strength training, or motor control. The outcome was undesirable that patients still had pain, performance was diminished and recalcitrants. Recalcitrants basically mean the patient was not very compliant. The patient did not perform or respond very effectively and was not as compliant with their frequent visits as compared to the other groups.

The next group did strength training only, which is pretty common if you think about physical therapy, physiotherapy, other sports, chiropractic offices, and physical medicine clinics. They might only be implementing strength conditioning. This group had strength conditioning only, which meant that they built strength and they had the capacity to perform tasks. But there were no motor control exercises and the result of this group again was undesirable. They still had pain, they still had performance issues and compliance was still a concern. The next group was having motor control exercises only, no strengthening. In other words, they really did not develop strength to perform tasks effectively. They were able to control their function a little bit more, but the result was less pain. The performance was a little bit better, but the capacity to perform higher loads of their activities was a bit diminished.

When we looked at the final group, the group that included both strength and conditioning and motor control, we had the best outcomes. They had good motor control, they had plenty of strength to be able to perform their tasks within their activities of day of living. Therefore, the result were more ideal.

Moral the story, make sure that we are including just not just motor control and not just strength conditioning, but a combination of both. You will see as we go through the rehabilitation pyramid and the protocol that I think works pretty well is to include motor control first and build strength in a stable environment. We will give you some ideas of what that means as we progress. Another reason why I think it is important to establish neuromotor control first before establishing strength and range of motion. Improving range of motion is really important, and that is one of the first things that I work on but while doing that I want to make sure that they have adequate neuromotor control. This was a really good study and has seven articles that support this notion. One of the final slides is a reference page that has these

seven listed. This was a study looking at a lit review, basically. Looking at a young group, 25 years of age and a really common problem. Glenohumeral joint instability, really common within our athletes. They found that if these athletes went through a traditional shoulder rehabilitation program, and when I mean and say traditional shoulder rehabilitation, I am talking about performing a range of motion exercises and strengthening. That is like rotator cuff strengthening exercises against air band and dumbbells. We found that if they are not including stability exercises, they fail the rehab 60% to 94% of the time. If we are doing anything and we are failing 60% to 94% of the time, what are we doing?

We need to reassess, audit, and change path. My direction is to include stability first and then start including and adding strength onto that stability. This is one of the rehabilitation pyramids again that we published, and this is more rehabilitation. If you look at the top here, the earlier pyramid that we looked at was for functional assessment, this is for rehabilitation. If we look at the rehabilitation pyramid, we talk about education. Doctor means teacher. We should be educating our athletes on everything they do, explaining why they are doing it, not just how to do it. Throughout the rehabilitation process, we want to make sure that their motor patterns, their engrams, are going down a path of an optimum engram. Make sure that they are not supporting, endorsing, encouraging a poor motor habit. We go from least invasive rehabilitation exercises to more aggressive. One of the first things we want to do is remove hurdles, remove negatives. If a joint is restricted, such as a TL junction, joint restriction is preventing my patient from going, performing over an upper body flexibility test, then let us adjust the lower thoracic spine. If there is some muscle tightness, let us do some myofascial release, and so on. We will go through some of these.

The first thing I want to do in my rehabilitation process is remove the negatives. The question always is, how long does it take to remove negatives? Sometimes it is that day and the next thing I can do right away is give them some stabilization exercises. Sometimes it is just that within that first day, sometimes it takes me a week or two or three to remove some of these hurdles so that I can then move to my next tier and implement static stabilization and cardiovascular exercises. It depends on the region and the complexity and the chronicity.

The next tier is implementing static stabilization exercises and cardiovascular exercises. As the patient has demonstrated competency and capacity for static stabilization, we will talk about that, then we can move on to dynamic stabilization. We will explain what dynamic stabilization is and how it differs from static. Once we develop a really solid, stable environment for the shoulder complex, now I am going to start building strength on it. Then lastly, we want to make sure that with their shoulder they can perform power movements, strength movements, speed, and agility movements. Maybe they are a boxer and they need to move fast and with power. We want to make sure that they can affectionately move through this pyramid from least invasive to more aggressive interventions in a safe and effective manner.

Tier one, removing negatives or removing hurdles. Well, there is several things that we can do. Some of the key things that I found to be very beneficial is to control a few things. One is to control inflammation and maybe look at their nutrition and see if their nutrition is complicating their healing. If they are eating a bunch of garbage, that is something that we can easily make some suggestions and changes to. Of course, I would encourage you to revisit your nutrition module within the ICSC because it discusses a lot about inflammation and nutrition.

Neuromotor control or neuromotor facilitation. Cognitive facilitation means making a conscious effort to make changes. If the patient is hiking their shoulder and they have a reverse glenohumeral rhythm, they may have to make a conscious co-contraction effort to facilitate centration of their shoulder in order to move through a more fluid range of motion. That is what I mean by cognitive facilitation.

Sometimes taping is beneficial, whether it be kinesiology taping, dynamic taping, or rigid strapping. We will talk about a case where I might use rigid strapping here in just a bit. Joint dysfunctions, adjust if needed. Sometimes it immediately helps significantly with shoulder function. Then tissue lengthening, so if there are some tight tissues and we can maybe make those predictions on posture and then confirm it with palpation range of motion, maybe some interventions such as proprioceptive neuromuscular facilitation might be of benefit.

PIR is Post Isometric Relaxation. If you have never heard of PIR but you have been doing PNF stretching, I am willing to bet you are doing PIR. I do encourage you if you are unfamiliar with how these two differ is to do some Google searches and do a little bit more of a deeper dive on it. Proprioceptive Neuromuscular Facilitation is different than Post Isometric Relaxation. There is a part of PIR in PNF, but it is quite small. I think there are a lot of people that do PNF stretching and that is what they call it, but it is really PIR. PNF is very complicated and involves a lot of angular movements and neuromotor control. Do a little bit of a deeper dive on that so you are speaking eloquently when you are referring to PNF. Then myofascial release techniques. Many of you know several ways of doing that, maybe using IASTM to assist you with it and some active lengthening exercises.

This is a real quick case from the FICS sport chiropractic team treating athletes at the World Games in Poland. Dr. Brian Nook was a chef de Mission, and as usual, he knocks it out of the park. He is just an awesome leader. He led a group of sports chiropractors very well. We were continually reminded every night that do not go into the field of play, where it might be on the bench, it might be on the pitch, it might be on the court, but do not go on the field of play. One time he said, unless you are invited by team doctor or the paramedics that are there, you are not to go onto the field of play. When we are at the World Games, we are working with the other medical staff, working closely with the paramedics and massage therapists. Each team brought their own providers, maybe even another chiropractor so it is really important that when you are at an event as part of the FICS team, you work in a collaborative environment, and we do not go to a venue all high and mighty, trying to fix all injuries.

So back to this case. This was an individual we were sidelined at roller hockey and playing in a game. He was checked up against the boards, fell down and was holding his arm. They had a medical doctor, which I had worked with before, with them on their bench. Having worked very closely with the medical doctor, I had developed a very good rapport four years earlier. In fact, when he walked in on day one of the competition, he recognized me. He did not speak very good English, and I certainly did not speak his language very well either, but we realized we recognized each other. The doctor pointed to the table where I was and said, "Can you bring his athletes here?" I figured that out, and I said, "Yes, absolutely. That is why we are here." So nonetheless, that rapport was there and working collaboratively and developing a rapport relationship is really important.

This individual was checked against the board and fell holding his shoulder. The other chiropractor that was with me, were playing a game of "Guess That Injury". I was wrong and he was right. He said, "I bet he dislocated his shoulder." I said, "No, I bet he broke his arm because the way he was holding his arm, his antebrachium." They helped him off the ice, and took him to the bench. Because I knew the medical doctor, I walk behind the bench. I am still not in the field of play, but I am standing behind the bench. He sits the athlete down, and they take off his jersey. Right away you could see the shoulder was dislocated. If you remember back in part one lecture, it looks pretty clear when someone's shoulder is dislocated.

I could clearly see that it was standing from where I was at. The medical doctor is looking at me, and this guy is in a lot of pain, and he is waving me into where the medical doctor was. I said, no, hold on, I saw the paramedics walking around the ice rink or the field to play, to come in there. The paramedics are all standing there, and the medical doctor is looking at the shoulder and palpating. I think he was palpating the clavicle

like the SC joint. I am shaking my head, no, that is not it. I keep pointing towards the glenohumeral joint. He is palpating along the clavicle, and he is looking at me, and I am going, yes, you are getting warmer. Then he got the glenohumeral joint. I said, yes, right there. He looks down, and his eyes got really big. He realized he had a dislocated shoulder. He waves me in again. I point to the paramedics, and I knew one of the four spoke English, and I said, Is it okay if I come in? He said, yes. I got approval, from Dr. Nook from the medical doctor of this team, and the paramedics. I came in, and reduced the shoulder, one of the more complicated reductions, but he reduced, and he went off. I would put him in a slinging swath just in case, and suggested he go in for an X-ray just to make sure there was not what type of two fractures. A bank hurt fracture, bankart lesion, or a Hill-Sachs. We want to make sure he does not have one of those fractures. It was one of the first times he ever dislocated. There is a higher risk of fracture, just so you know as well. Prior to reducing the shoulder, I checked for silver dollar sign. Remember we talked about silver dollar sign, which was palpating the lateral part of the deltoid? Making sure he is not numb there, which would be an actual nerve rupture. Maybe due to a humoral head fracture, which sometimes is more common as well with first-time dislocators. Nonetheless, he came back later from the ER, and the X-rays were negative. He did not have a fracture. Guess what? He wanted to play. We evaluated him when we had some time, however we knew he was not going to be playing that day, but he wanted to play the next day. I looked at the coach. I said, you really need him the next day. He said, well, it would be nice to have him. I evaluated him, and you would think that because he just dislocated his shoulder, for one, he would be in a lot of pain and you would not want to play. But athletes are unique, and you would think there would be some instability. Well, I evaluated him and he had full range of motion, and he was not wincing at all. I muscle tested every position of the shoulder I can imagine, and he was strong and solid, as strong as the uninjured side.

I checked for sulcus sign instability and for apprehension, which is has high sensitivity and specificity if you refer back to that one chart. I checked for apprehension, and he was negative. I clearly had no good clinical reason to hold him out from sport. I had a good historical reason because he had just luxated, but I had no clinical reason to hold him out. The next day comes about, and we re-evaluate him again. I thought, when he comes back the next day, he is going to be swollen and sore, and his range of motion is going to be bad. Sure enough, he comes back the next day, no problem. Strong, no pain. I really get in there and dig on that anterior capsule, no tenderness. This athlete was like, Superman. I talked to the coach and I said, do you need him today? He said, you know what, we could probably do without him today. I said, great, let us lift this brooder heal up. Sure enough, two days later, the coach said, I could really use them. The athlete said, yes, he wants to play, so we did some rigid strapping.

Let us talk about this rigid strapping. You should learn this in your taping hands-on for FICS. What we did is we created a basket weave right over the anterior part of the shoulder. We have tape running this way, we have tape running this way, so basically creating a basket weave, which makes it very strong. The way we taped them was to prevent the humeral head from gliding anteriorly, which is where it dislocated. Now, generally, I do not put the strapping right here. But when we were traveling, we could not take any aerosol cans with us, and I had no tough skin to make the skin really sticky. If the skin is sticky or tacky, this tape will stick really well. But because I did not have that, I had to make sure the tape was not going to come off.

I had to do some extra strapping around his rib cage. We want to make sure it is functional. That is why I took a picture of him with his hockey stick. He is left-handed with his hockey stick, I wanted to make sure that he was functional and he could perform most of his motions with his hockey stick. When he went out to play, I was keeping my fingers crossed every time he was on the ice. He went out for 60 to 90 seconds on every shift, about nine or ten shifts during the game. He performed wonderfully. Every time he got hit, I was a little concerned, but he would get up. He injury held up, and he was very thankful as was the whole team afterward. Sports chiropractors at these international games, can contribute to the athletes wellbeing and performance.

I apologize for the length of that case, but I thought that was an interesting acute case. Because for the most part, we see and discuss chronic cases.

Let us talk about some more tier one hurdle. One of them could be inflammation. There is several different ways that we can control inflammation. Earlier we talked about icing, when we mentioned P.R.I.C.E. and why we do not ice for inflammation. That is basically what the contemporary literature is saying anyway. But there are other ways of controlling inflammation. Here is compression. Here is an example of compression using a game. Ready? This is me at Rio in 2016 Olympics. We had four-game readies where athletes are basically coming in asking for it by name. It is a cold or cryo-compression unit and works great. Then NormaTec- NormaTec is more of a pneu. Pneu as in P-N-E-U, or air compression device. It squeezes from the fingers to the wrist to the elbow all the way up to the shoulder and then does that repeatedly to manipulate inflammation in the upper extremity. So here are several literature articles talking about how compression might clear out inflammation. We also know that nutrition can assist with inflammation management, and there is a long list of articles much longer than this. But prolific enzymes and fishing oils are just a couple of means of managing inflammation through nutrition.

Cognitive facilitation, so if this patient has poor posture, it might be predisposing them to some shoulder injuries, maybe through scapular dyskinesis. This is an interesting brooder's exercise or a posture exercise where we wrap the band or some sort of elastic band around the feet, around the toes. We cross it at the heels. The first thing we do is we have them dorsiflex and then we have them separate their heels from each other. We have them abduct their hips and externally rotate. You can see the air band wrapped around their thighs. We have them supinate. We have them externally rotate, and then we have them abduct and horizontally extend their shoulders. Really firing the mid trap and low trap. You can see him tucking his chin. To reverse it, I want to go super slow, much slower than what he does. We want to bring the elbows in slowly, internally rotate, slowly pronate, slowly abduct the hips, and internally rotate the hips. Slowly bring the ankles together and slowly plant a flexible ankle, and do this repeatedly. This is a super simple exercise.

We will watch this video here.

Really simple exercise we can have our athletes working on a day-to-day basis. They can do a little bit of this before they study, a little bit after they study, maybe a couple of times a day. But this really assists with improving posture. I feel it does anyway. It is something we send them home with and we can progressively make it more challenging. Here he is using a red band. If this patient was able to repeatedly rep out this exercise for 90 seconds to two minutes and really not reach fatigue, then I would go up to maybe green. Depending on the color scheme of the company you use. So green would be a little bit more aggressive. Repeatedly just repetition, repetition, repetition. If they can do it for 90 seconds to two minutes and really not feel much fatigue, then I make it a little bit more challenging.

Some more tier one interventions and I am not going to go through a lot of this literature, which is in your notes which talks about chiropractic manipulative therapy for the upper extremity. You can read this on your own, taking a deeper dive later as you look up the articles. But there is one article that I want to refer to and it talks about the thoracic spine. I mentioned earlier that almost on every shoulder case now, I look at the lower thoracic spine. If I am going to adjust one area of the spine, I am going to adjust the lower thoracic spine. I thought the cervical spine was going to be the most important, and I had four years into my practice. Now I find that my outcomes are a lot better if I address a lower thoracic spine. This study supports the notion of looking at the thoracic spine for improved shoulder function. The premise is that the lower trapezius muscle seems to elevate or have improved tone, muscular tone for better scapular control.

Tier one still trying to remove some of these negatives or hurdles, and soft tissue restrictions. Soft tissue restriction is common. This is an example of me performing motion palpation of the soft tissues in the axilla. What I am feeling is for axilla soft tissue tone subscapularis, the medial latissimus dorsi, the lateral side of the trapezius. I am just basically motion palpating. I am gliding the fascia layers of fascicles of the muscles on each other trying to find a restriction. Once I find a restriction and know the plane of the restriction, I then have the patient relax and I thrust into that plane of restriction, of that fascial restriction. I hope that makes sense. You might need to rewind that and hear that again. But the soft tissue manipulation is very fast, very effective. Another way of manipulating soft tissues is to have the patient do some home exercises. The posterior capsule, measuring it on internal rotation in that prone position if I feel the posterior capsule is tight. This what is called a sleeper stretch. A sleeper stretch seems to be beneficial for the patients when they go home, and they can do something proactive on their own. I have the patient lie in a position of scaption.

Let us talk about this because when I look at videos, YouTube videos, textbooks, and look at other literature, I see this being done in a position where I am not happy with it. When I say scaption, you can see that she is angled back here a little bit. She is angled back at about 30 degrees. She is got all of her weight on the scapula, the flat body of the scapula, and then the glenohumeral joint is at about 90 degrees abduction. The elbow is at 90 degrees. Then she internally rotates when she feels that there is some resistance there. Then she takes her other hand and applies a little bit of overpressure. She should feel a deep ache in the posterior, glenohumeral joint. If she feels it in the front, then put a slight little pillow or wedge underneath the elbow to lift the elbow off the floor or the therapy table. That might put a little bit more of a stretch on that posterior capsule. Sometimes it takes a little bit of playing with it. Where the mistake I see oftentimes is they are straight up and down lines clearly on the glenohumeral joint and not on the scapula. I think our intention here, lying in scaption, is to stabilize the scapula to the floor so it does not wing away from the shoulder or the rib cage.

To do this in your office, it is very similar positioning for that internal rotation assessment. So let us talk about these positions. What I want to do is place my forearm on the scapula blade- the blade of the scapula, and then that same arm is going to come across and stabilize the humerus in 90 degrees glenohumeral abduction. My other hand is, and you are going to be in a lunge position, is grabbing onto the distal antebrachium or the forearm and internally rotate the glenohumeral joint, and you will internally rotate until the patient says, yes, I feel it. Then the question is, where do they feel it? Do they feel a deep ache in the posterior glenohumeral joint? If so, that is what our goal is.

If they say, oh yes, I feel it in front of my shoulder, we do not want them to feel it in front of their shoulder. Then we are stretching the anterior capsule. What you want to do then is drop the elbow closer to the floor, right? Horizontally flex the glenohumeral joint just a little bit, just like we did in this other video over here. So again, stabilizing the scapula, stabilizing the humerus with the same arm, and then internally rotating the humerus with the other hand. Then I hold that position for about five deep breaths. I want them to take a deep breath and relax., dep breath, relax five times. Then I let it off a little bit and then I go back into the stretch. A little pearl and some of these slides that you may have noticed, I think some of these pearls are things that I found to be very beneficial in my clinical practice.

Some more literature here real quick, and we talk about stabilization. I think it is important in these first couples of tiers to really hit stabilization. In other words, centrate-teaching the shoulder complex. In this case teaching the shoulder complex how to centrate. This article from 2009 said established stabilization of centration of the glenohumeral joint gap of thoracic joints. They also stated that when you are strengthening- not strengthening, but conditioning. Conditioning is a better word. When you are conditioning the rotator cuff, you want to condition it for the function of the rotator cuff.

What is the primary function of the rotator cuff? To centrare the humeral head in the glenoid process. So we want to train or condition the rotator cuff to be a glenohumeral stabilizer. We do not want to train it to be a mobilizer, in other words, firing against a dumbbell or tubing in one direction against the higher resistance. That is developing strength. That is not what we want to do initially. This is my view, and it is worked out really well. We want to train or condition the stratus anterior to be a scapula stabilizer, making a scapula fire against a resistance in one direction, doing like protraction strengthening exercises. It might make it strong, but it might not make it smart. It probably does not understand the neuromotor control function of the scapula interior. Keep those things in mind as we progress on. This article concluded that an operant scapula position and humoral rotation can affect injury risk during humoral elevation. Making sure that we have good centration and stabilization before developing strength, so we have optimum motor control. I think is going to be helpful for your patient.

Tier two, now we want to start implementing stability. We have removed some of the hurdles, some of the joint restrictions, and the tight muscles, to implement some stability. This is in the background here, we see Carl Lewis, one of the most medal Olympians ever in the history of the Olympics and he is wearing high heels. This athlete is strong, he is powerful, he is fast, he is agile. But you put him in heels, and you lose that stability. He clearly is not going to be able to perform like he did with being in regular shoes. So, tier two, let us talk about some exercises. How do we implement stability? We want the patient to co-contract and then train that co-contraction. We want them to contract their rotator cuff muscles, a stratus anterior, the mid to low trap, pec minor. We want them to turn off or turn down a little bit the upper trapezius. Turn up the mid and lower trapezius. I find the body blade to be very helpful in this context. This is a very easy position with the elbow nearby. I have them oscillated back and forth. My goal is to have them perform this body blade motion for 90 seconds to two minutes without reaching moderate fatigue. If they reach moderate fatigue at 40 seconds, I want them to continue with this exercise until they develop motor endurance.

If they can do 90 seconds to two minutes and barely reach mild fatigue, then I am going to make things more challenging for them. One way of making things more challenging is to move the elbow further away from the body. So similar concept oscillating back and forth is called Oscillatory Stabilization, by the way. Having the elbow further away from the body does make it more challenging. Here we are even further away from the body and clearly does make it more challenging. We want to make sure the reason why he is doing it in a mirror. We can see a different view, but oftentimes I have my athletes doing in the mirror because if they are oscillating back and forth, oscillating, and if they are hiking their shoulder, that is not good neuromotor control. We want to make sure that they are looking at what they are doing so they can do these exercises correctly.

A slosh bar basically is a PVC pipe, a plumbing pipe that is sealed on both ends and it has a little bit of water in it, and this one is probably one of the heaviest ones that I have. It is only about 15 pounds, so it is not very heavy, 15 to 16 pounds is about as heavy as I am ever going to go, even with some of the strongest athletes that I have. Because controlling this bar is important. So with tier two, we do not want the shoulder to go through a range of motion. We want the shoulders to stay stable. Hence, tier two is referred to as static stabilization. The shoulder complex is staying stable other than oscillating, but it is not going to a range of motion. In this video, you can see this individual, his shoulder complex is remaining static, but he is doing lunges. He is making a little bit challenging for himself because the water is sloshing all over the place and he is really struggling to try to centrare and keep his shoulder complex stable.

Here is another video of him performing a lunge and he is going fast. He is a high performance, athlete. Muay Thai, Brazilian jiu-jitsu, mixed martial artist. He is strong and stable, but I truly think that going slower is harder. So have your athletes do these lunging exercises when they are ready, but slow. So, another thing

to consider now in regard to duration and total volume of exercise. I am less concerned about how many squats he is doing or how many lunges he is doing. It is less important to me of the counting, the number of repetitions he does with squats and lunges. It is more important to me to have him develop motor endurance, motor control endurance. Co-contracting the shoulder complex for 90 seconds to two minutes. If he can do squats really slow or lunges really slow for 90 seconds to two minutes and not really reach much fatigue with the shoulder complex, then he is able to move on to probably tier three and do more dynamic stabilization. Earlier in this lecture we mentioned that tier two was also for cardiovascular conditioning. We want to implement cardiovascular conditioning as early as we possibly can. But we do not want to introduce it so early, where their hurdles, remember tier one, those hurdles are being reinforced. If they have a poor motor pattern, we do not want that poor pattern to be reinforced. With cardio, I generally started with when I clear out some of these hurdles and implement cardio as early as possible.

The reason why is we want cardiac output to go up. We want blood to go round and round. In other words, an injury is not going to heal if it does not get adequate blood supply. So cardiovascular exercises that published a paper back in 1997 that was a literature review. Looking at cardiovascular exercises and those that did cardiovascular exercise early in rehabilitation shortened their rehabilitation time, which is one of our goals.

It is important to select a cardiovascular exercise that your athlete enjoys. Me, personally, I do not like water. To have my therapist tell me to go on water and do rehab, I am probably not going to be very compliant. I would rather get on a bike or hit a heavy bag or something like that. Make sure we are picking exercise that your athletes are going to enjoy. Tier three is dynamic stabilization and when we refer to dynamic stabilization, we are referring to the shoulder complex. Moving to a range of motion while performing oscillatory stabilization or some other exercise. In this video, the athlete played baseball when he was in college. He is showing me his baseball pitch, and going through his range of motion. I am going to try to replicate that because athletes want this to be beneficial for their sport. I would have him also reverse. In this video, if you were to imagine I hit rewind, I would have him oscillate all the way back to that starting point again and then go forward. Here, he is going through his sport motion, and I am now implementing an oscillatory stabilization exercise throughout this entire range of motion. Now, again, I do not care about how many times he does it, I am more concerned about the duration of it because I want to build endurance at this point. I want to have him perform this exercise with a goal in mind of 90 seconds to two minutes. If he starts fatiguing, moderately fatiguing at 40 seconds, then he is going to continue doing this exercise day in and day out until he builds up that endurance.

This is just another exercise, but it depicts the point of him going through shoulder flexion while he is performing this oscillatory stabilization maneuver with the body blade. Utilizing the dynamic slesh bar in tier three. In tier three, as dynamic stabilization, we have the shoulder complex go through a range of motion, preferably a full range of motion. We need to have stabilization throughout a full range and see him slowly going through shoulder flexion while trying to stabilize this bar. So now you can see this bar is a bit smaller in diameter. This bar probably weighs 6 pounds, 9 pounds somewhere in that range. You know, 3-4 kilograms. I do not care how many repetitions he does, it is all about time, 90 seconds to two minutes as a goal. He goes up and down as slow as he possibly can, controlling that until he reaches moderate fatigue. If it takes two minutes, then we can move him forward. Maybe he is ready for strength training, which would be tier four.

Another thing to consider with controlling the intensity of this exercise is the width of his hands. The wider his hands are, the easier it is going to be. If he is wide, let us say he fatigues at two minutes here. That really was not that hard before moving him to strength training. I might just move his hands closer, which makes it more challenging to control the water that is in that tube. Here is an example of a tier three slesh bar intervention. You saw this individual earlier holding the bar over his head and just doing a squat here. He is doing a push press squat, and moving his shoulder complex while he is trying to also balance and stabilize

the water that is in this bar. We are looking for 90 seconds to two minutes for the goal duration. If you do not have a slosh bar or body blade, you probably have a gym ball. You can perform a lot of these static and dynamic stabilization exercises with a gym ball.

Here is an example with a medicine ball over her head. She is co-contracting her shoulder complex. She has got good posture, her feet are rather wide apart, and she is sitting on an unstable gym ball, right? Gym balls round, it is going to roll around. It is fundamentally unstable if she can hold that ball over her head statically. We are talking tier two and for two minutes and not really reach much for fatigue. We can bring her feet together and make it less stable. With her feet apart, it is more stable. With her feet closer together, it is less stable. We can then as we move into tier three, we can have her then move her shoulder complex to a range of motion while in this unstable environment. When we go from tier two to tier three, we might want her to move her feet wider apart again to develop a stable base. But as she progresses, narrows the base once again. Here are some examples of doing some push-ups or some static stabilization. Closed chain exercises with their hands fixed to the floor while performing a variety of different core tucks and push up positions on an unstable surface of the gym ball.

We talked about strengthening earlier. It is important for me to stabilize the shoulder complex before developing strength onto it. This was a study that looked at weightlifters and all they did was strength training. It was done on 88 females, and they broke them up into two different groups. Well, when they were attracting the subjects, 31 of them were non-lifters. They have never really lifted before, at least doing bench press types of exercises. Then 57 of the 88 were recreational weightlifters. They had experience weightlifting, so they put both groups together and did some pretesting first. They tested internal rotation and overall strength, several parameters. You can see that little pearl right here, this was an important study. But they did some preliminary range of motion and functional tests prior to the study, then they had both of these groups go through a weightlifting program and a strengthening program. At the end, they did all these physical parameter tests once again, and they found that the weight lifters compared to those that did not lift. They did split up the group of individuals, and had half of the group do weightlifting. I think it was a six-week study. Half did weightlifting, the other half did not. They found that those that did weightlifting, strength training, they had decreased internal rotations statistically across the weightlifters. They also found posterior capsule tightness and increased anterior glenohumeral capsule laxity.

Really important, that I feel that we have appropriate stability of the shoulder complex before building strength. When we are building strength, maintaining that stability, and maintaining the overall functional range of motion. Some more tier four exercises, we are developing mobilizer conditioning, which is the term we use in the pyramid. We also refer to this tier as strengthening. This is where we are firing against a heavier load in a unidirectional or single plane, a single motion. Scapular dips, here she is using her body weight and she is basically contracting lower trap, maybe some mid trap, maybe some latissimus dorsi. Trying to depress her scapula against resistance. In this case, the body and gravity are her resistance. Then for scapular push ups, many of you might think that this is a rattus anterior strengthening exercise and that is great. Remember, serratus anterior motor control is far more important than serratus anterior strength, at least initially. If I found that when I muscle tested my patient's serratus anterior if I found that it was weak, then I would strengthen. But if it is strong like that swimmer that we talked about earlier, we may not need to strengthen. In fact, I am all about strengthening. As I get older, I realize how important strength is.

After 30 years of rehabbing patients and prior to the sports chiropractic world, I was in the strength conditioning world. I found that most of my patients would go through these first three tiers and they would be done. They were already strong because I was dealing with athletes for the most part and I did not need to strengthen them. Those first three tiers when we are rehabbing a patient, especially with the shoulder complex, are going to be the most important. I do not mean to be little tier four in the strengthening phase, but I want you to understand that the first three phases clearly, truly are more important.

Exercise for developing strength, for retraction of the scapula which is basically protracting here in an eccentric manner, and then concentrate on contracting her scapula retractors. Internal-external rotation using thera-tubing. This is probably what a lot of you have done for rehabbing the shoulder. This is a strengthening exercise because you are firing against a single resistance or firing in a single plane against a heavier resistance. You can see that she was initially going slow and then she lessened the intensity and started doing some faster range of motion. There is some evidence to show that at the good progression is to fire against a higher resistance slower. Then to lessen the resistance and then finish off a few of the last repetitions at a higher speed. You can see that she has what she is going to do here with internal rotation and just a little bit faster. Same full range of motion.

Then here, this is more of like an empty can position. Some of you might think it is a supraspinatus strengthening exercise. Sure, we can call it that. It is shoulder abduction in my world, or in the position of scaption, which is about 30 degrees forward flexion.

I basically took an orthopedic test, Gerber's lift-off test. We talked about this in part one, I took that subscapularis muscle test and turned it into a little exercise. I call these subscapular push ups. We have the patient with her heels just a little bit away from the wall, and then we have her recline back. We have a mirror strategically placed here so that you can see a couple of different angles of what she is doing.

Thank you

[END]