

ICSC06 Upper Extremity Module 6

Part 3 Shoulder Intro Examination and Conditions

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Video Lesson: 1:35 Hour/minutes

My name is Tim Stark I have been involved with FICS since I was in chiropractic school, well, over 25 years ago, and have been honored to represent FICS in multiple capacities. My history goes back to being the Chair of the Education Commission. I was the Chair of the Education Commission for almost about 10 years and I was the past director of the Human Performance Center at Northwestern Health Sciences University. The past coordinator for the Northwestern Health Science University Sports and Rehabilitation Continuing Educational programs. Currently, I am involved with a couple of opportunities. One is a consulting service called Stark i3, which stands for ideate, innovate, and integrate. I am the Chief Executive Officer for Back2Life Incorporated, which is an integrated multidisciplinary collaborative clinic system in North Dakota providing primary services to our military veterans and other service personnel. I am honored to be asked to contribute to the International Sports Chiropractic certificate through FICS.

Let us get started with what we are going to be discussing. When I teach and start off a new topic or a new course, I like to start with an Ipsative Assessment and Ipsative Challenge. There is a long list of questions here, you can stop the video and read the questions yourself, but I want to highlight a few to think about as we are going through this lecture. The questions get a little bit more challenging as you progress through and then end up with more of a practical application, for example. Starting off simply, what joints make up the shoulder complex? Is it just the glenohumeral joint or are there other joints that we should consider? I know you have just completed a refresher the biomechanics module, so we are going quickly run through the biomechanics component of this presentation. In regard to shoulder pain and ranking, where does it rank in regards the low back pain? What are some of the more common athletic shoulder injuries that one might see? Does posture even play a role in shoulder pathologies? In regard to dislocations, how do they typically dislocate? What is the mechanism of injury? If that humeral head is going in a particular direction, which direction does it typically go? True or false. Can Doctor of Chiropractic manage any non-surgical shoulder case? We will talk a little bit about that as we go through it. What are some of the more common pediatric injuries that one is likely to see or are they more likely to see chronic injuries? As a doctor, are you more likely to see traumatic or acute injuries? Is a child athlete more likely to suffer a sprain or a strain? Do you know the answer to that one?

We have some literature as well, some recommended reading for you which is included in this module and I found a pediatric article going back to 2016 that I thought highlighted athletic injury shoulders to pediatrics really well. There are some practical applications, too, in regard to some orthopedic tests and joint manipulation of the shoulder for you to consider. In all of this, keep these thoughts in mind as you go through. There might be some other questions that you might have as we go through this discussion. What we are going to do first of all, in regard to our objectives and this entire shoulder topic, is to break it up into 2 components. This will be part 1 an introduction to shoulder conditions examination, your traditional clinical examination. Then the 2nd part will be more of your functional examination or functional assessment in rehabilitation but, primarily covering everything in regard to our objectives. What we want to cover is we want you to be able to identify what are some of the more common acute and chronic injuries identified in sport. I am sure you can name 3 or 4 of them right now.

We will highlight a few considerations for athletic injuries within the sport, including epidemiology and other mechanisms of injury shoulder examination, again. Clinical examination flow, functional examination flow, do a little bit more of a deeper dive on pediatrics. I think most, maybe a good percentage of chiropractic schools do a pretty good job on covering extremities. It might not peel away

the layers and get into our special populations such as pediatrics. Then, talk about some injury risk mitigation and some management of these common mechanisms. We might get into discussions about medical-legal concerns, and some conditions. Then, manipulative therapy and we have some literature here for you to do a deeper dive on the benefits of chiropractic manipulative therapy for shoulder dysfunction.

Anatomy of the shoulder complex. Surely, you should have graduated from chiropractic school and have a pretty good understanding of what the different joints are of the shoulder. These 4 joints are important to address each one of them when you are dealing with a shoulder complex condition. Clearly, we are dealing with 3 buoyant bones forming, these 4 joints. We want to clearly understand that the mechanisms and mechanics, the Kinesiology, and the study of the movement of the shoulder complex can be quite complicated that is why I like it so much. It is a more challenging condition and region of the body, for sure. I will reference you to the biomechanics module for further details on kinesiology and the study of the biomechanics of the shoulder complex. When we start looking at the shoulder as a moving mechanism and pathophysiology, pathomechanics of a shoulder and managing that. We really need to consider that if you injure the glenohumeral joint, it is quite likely the AC joint, SC joint, and the scapulothoracic physiologic joint, probably is involved as well to some degree. When you are addressing the entire shoulder complex, you would be remiss if you did not look at the entire shoulder complex. As chiropractors will want to look at the axial components as well as the cervical spine and the thoracic spine.

Let us look at some foundation information, some high-level information. Shoulder pain is responsible for approximately 16% of all musculoskeletal complaints, with a yearly incidence of about 15 new episodes for every 1,000 patients seen in the primary care setting. That is quite a bit and we have some older literature here and we have known this has held true and the reason why they are listed here as some of the older literature, is just to make you aware that this has not changed. Shoulder conditions and shoulder problems have been prevalent for a long time. An estimated 20% of the population will suffer shoulder pain at some point, within their lifetime. Shoulder pain is second only to low back pain in patients seeking care for musculoskeletal ailments in the primary care setting so interesting. You might be good at axial skeletal condition management, cervical spine, thoracic spine, and lumbar spine. It would be wise of you to become very good at the shoulder.

I remember on my first year of practice, after I left my residency at Northwestern plus I was playing a lot of competitive volleyball at that time, I saw a lot of my fellow volleyball players. I naturally had a very busy shoulder practice right away from the beginning. But even then, even when my vertical jump started going lower and lower, and I moved away from playing volleyball, I still appreciated a large shoulder practice. Wrap your head around shoulder complaints. Do not just depend on these 2 parts in the ICSC and the current literature being published constantly, be digging into shoulder conditions and becoming very good at managing shoulder problems. Clearly, there is a long list of possible shoulder conditions that one should be considering from acute injuries to chronic injuries, and of course, the list is even more extensive than this, but this will give you some idea of what some of those more common shoulder conditions are. As you are addressing shoulder conditions, we as doctors, need to be very good historians, very good historians. We need to be very good at asking questions and asking the right question. To understand one's history, we need to be able to ask a question so that we get an answer that helps us clinically reason to come to a lengthy differential diagnosis and eventually, narrow that down into a working diagnosis and maybe a couple of other differentials. But our history is really important, and the history can give us some really good ideas on what may be problematic or pathologic for the patient.

For example, just dealing with the age of the patient, which really is not in history, I guess, it is more of a demographic. But in regard to the age of the patient, if the patient is younger than 40 years of age, we can lean towards the diagnosis of shoulder instability or rotator cuff tendon apathy. If the patient is older than 40 years, we can lean towards a patho-diagnosis of rotator cuff tears, adhesive capsulitis, or glenohumeral osteoarthritis. If they have underlying comorbidities, such as diabetes or thyroid disorders, maybe we are going to lean more towards adhesive capsulitis. If there is trauma, which if we are working with athletes, primarily it makes sense that you were probably going to see more trauma in our offices. If there is a history of trauma, if the patient is older or younger than 40 years of age, we might think of luxation or subluxation and if they are older than 40 years of age, we might think of rotator cuff tears. This is important to complete a proper history and asking the right questions is really helpful for us to understand and come to a working diagnosis. Understanding where the location of the pain is very helpful.

Let us talk about sports participation. Did the shoulder condition start because of shoulder participation? If so, we might think about shoulder instability as one of our primary conditions, and again, this is just very preliminary thinking in our clinical reasoning process. Of course, we are going to do an examination to rule in and rule out. But history really helps us quite a bit to narrow down this long list of differential diagnoses. When we are performing a history, let us say a patient says, "I have left shoulder pain." As soon as the patient says they have left shoulder pain, we should start thinking of our differential diagnosis and not just MSK, not just musculoskeletal diagnosis. We must consider these zebras and what I mean by zebras, that might not carry over across the waters. There is a saying that if it looks like a horse, acts like a horse, and smells like a horse, it is probably a horse. In other words, if they have been playing football, if they have been playing tennis and they have shoulder pain, it is probably a strain of an injury. But we should consider maybe it is not a horse, what if it is a zebra, what if it is one of these stranger things that could be causing shoulder pain? That is what I mean by we must consider zebras and we have to clearly consider neurological causes for shoulder pain. Myofascial causes for shoulder pain, skeletal or osseous causes, including joint causes for shoulder pain, and visceral and vascular causes for shoulder pain. This picture depicts somebody who has presenting to you with left shoulder pain, it could be a left lung, it could be the heart, or it could be maybe a spleen issues causing left shoulder symptoms. Do not forget that as competent clinicians, as we are managing our patients.

This was an interesting paper published a few years ago in 2002 and it talked about chronic conditions within the shoulder. This paper defined chronic shoulder conditions as symptoms lasting more than 6 months, which is interesting. When we talk about the chronicity of almost any condition, it is maybe 2 weeks or 4 weeks. But this paper talked about how shoulder should be considered to be chronic shoulder conditions or shoulder pathology pain, for example, should be considered chronic, if it is 6 months or longer. We will take that into account whether we agree that 6 months is appropriate for chronic or if you would refer to other references saying something around 2 weeks or 2 months. But nonetheless, the paper further went on then and said, "If they do have chronic shoulder conditions lasting 6 months, we could probably break these conditions down into 6 diagnostic categories." One being the rotator cuff and other soft tissue conditions such as tendinosis. Second, in adhesive capsulitis. The third is glenohumeral osteoarthritis. Fourth, is glenohumeral instability. Fifth, acromioclavicular joint pathology is ranging from joint brains to osteolysis of the distal clavicle, etc., and sixth being other chronic conditions that are just simply less common. It is an interesting paper, nonetheless. The literature is listed there for you if you wish to do a deeper dive on that paper.

After we perform a history on our patient in our traditional clinical examination, there is a particular flow that I teach my students. I have been teaching this to the undergrad chiropractic students. I have been teaching it to other disciplines when I am speaking to physical therapy students and other

providers within the healthcare field. I have been teaching this amongst the sports chiropractic postgraduate level, as well. It is a simple acronym, and it is **H-I-P-P-I-R-O-N-I-L-S**. If you write that down, HIPPIRONILS, H-I-P-P-I-R-O-N-I-L-S. It starts with history. Then, of course, after history, there is a little silent V that I didn't mention. **V for vitals**. We clearly want to take the vitals of our patients. If they do have a cardiovascular event causing left shoulder pain, we clearly want to have appropriate vitals to help us qualify that. Then, **I stand for inspection**. **P stands for palpation**. The **second P stands for percussion**, and we go from least invasive to most invasive by the way, in this examination. **History, vitals, inspection, palpation, percussion**. Then the next **I stands for instrumentation**. Then, we have **R for a range of motion / O for orthopedics / N for neurovascular evaluation / I for imaging / L for laboratory assessments / S for special tasks**. I realize across the languages, HIPPIRONILS may not carry through but nonetheless, you can clearly write this out. Maybe create your own acronym that fits your own language for the time being, but this will really help you with the flow. If you are a younger doctor, maybe you are still struggling with how to properly flow this out. If you are an older doctor, like myself, I still occasionally miss things, and I like to have a system like that to be able to refer back to make sure I do not miss anything.

Let us get back to the slides here. Inspection, normal anatomy and I have an X-ray here and we are not jumping to the I, we are not jumping to imaging. But I generally put an X-ray up first when I am teaching when I talk about normal anatomy. Because I think it is important to know that when we look at a picture such as this when we have a patient in front of us, they have hills and valleys. Some of these hills are created by osseous structures, it is not necessarily swelling. The reason why I put this here is we cannot forget about our anatomy when we are looking at and inspecting our patients. We want to make sure that we understand what normal anatomy is and where these hills and valleys are created. For example, the valleys above and below the clavicle, and the hill that is created by the clavicle itself. When we are evaluating our patient with a normal posture and it is about as normal as I could find when I was searching for normal postural pictures, we are going to see quite a few abnormal ones here in the upcoming slides. We want to make sure that the shoulders maybe are close to average height. The head is in a normal plum, not laterally flexed, not rotated, etc. Clearly, you should understand inspection well.

This is not an uncommon inspection finding. I have seen this, especially in my younger athletes as they come in and they are just apathetic to life sitting on your table, not really wanting to be in your office, in the first place and so, they tend to slouch. Then, they go into this increased thoracic spine kyphosis, increase cervical lordosis a lot of cranial extensions, and maybe anterior carriage of the head. That are all real typical things that we see but let us point at the shoulder here for a second. If you look at the acromion process just on the end here. If you look at my mouse here, the acromion process and if we look at how the acromion process is really close to the manubrium, as compared to how far it is from the CT junction. We put them in a proper posture which we consider maybe to be a little bit more proper. We have the acromion process now, which is pretty centered right in between the manubrium and the CT junction. That is one of the things that I look for when I am looking at a patient from the side in regard to shoulder position. What would cause this? We know that is probably scapular protraction. Scapular protraction that is causing our shoulder to round forward. Therefore, we have a lot of apparently lengthen tissues posteriorly and aberrantly shortened tissues anteriorly. The glenohumeral joint will likely respond or compensate to the scapular protraction by externally rotating. Let me say that again, a humorous, oftentimes compensates to the scapular protraction by externally rotating. If they maintain this posture for a long period of time, we can maybe imagine as well, that the posterior capsule is getting shorter and shorter and shorter. Therefore, we may need to be able to consider some interventions to manage that. More postures, typical where we see a decent posture versus an aberrant posture and where that glenohumeral joint and that acromion process is positioned in between the manubrium in the CT Junction.

Let us look at some front views. Here we have a couple of individuals as they are standing. If we look from head to toe, toe to head, we can clearly see a lot of asymmetries in these individuals from the angle of how they are towing in or towing out from the bottom up. We can see maybe some differences regarding their knee positioning and their pelvic height. If we look at the spaces between the elbows and the ribs, comparing left to right, we can see that there are some differences. For example, on this one here, we can see light all the way from his axilla back to down to his wrist. As compared to the other side, we just do not see that. That may be a good indication that he has scoliosis. As you can see, he is not plum as well, his sternum is shifted to the side. He clearly, most likely has some sort of involved scoliosis. Then, we ask those questions. How does that play a role with shoulder complex function? If they have scoliosis, it is going to affect them. We are going to talk about a case later when a scoliosis is significantly called the cause of dyskinesia of the shoulder complex. We do know that postures just are not static, like the previous pictures we have just looked at. Especially in athletics, postures are quite dynamic. A dynamic posture from doing crazy things of bending over backwards from their spine to pulling and pushing people in particular sports. Of course, these younger athletes and college athletes are going to school and if they have vision issues, that could clearly affect how their functional posture is being influenced on a day-to-day basis. We want to ask those historical questions about what sport are they in? Are there particular activities within their sport that seemed to exacerbate things? What about school? Is it worse with school, etc.?

Let me start asking you some questions and let us play a little bit of a game here. This posture is typical of what we might see in a younger lean athlete. At any point in time, you can stop the video and just take a longer look at some of these slides. Take a look at this picture and write down a few things of postural issues that you might see. We are making some predictions, as to some of these postural things that you see. This would be a good thing to consider writing.

Let us take a look at what we might see. We see clearly, a bit of space between the right elbow in the ribs and that base is quite a bit larger on the left-hand side. That might be indicative of scoliosis or at least, some sort of posture and maybe an intelligent posture influencing this patient's view. We can clearly see that he is got scapular winging on the left-hand side as compared to the left and what indications might be involved with that. I know many of you are probably thinking that the serratus anterior is weak, but we cannot make clinical determinations of motor weakness or motor strength based on posture. If we are making a clinical indication that a muscle is weak, it has to be tested for strength. You just cannot look at a particular muscle and make that determination of strength or weakness. Yes, we can maybe make that prediction that the serratus anterior might be weak. Therefore, the next thing down the clinical examination flow at some point in time is maybe to manually muscle test or use a handheld dynamometer to test the serratus anterior to quantify it. Some other considerations in regard to some postural gages or predictions of this might be maybe his pec minor is chronically short and that is causing an anterior tilt of his scapula. It is only a prediction, a guess. Therefore, the next thing we do is go palpate that pec minor, maybe do some range of motion and see if that pec minor is short. But we can make a fair number of predictions based upon what we see in a postural examination. Here is a youngster with sprinkles deformity and again we can see that his scapula is quite elevated on that one side again. Then, therefore, elevator scapula is probably chronically short here. The upper trapezius is probably chronically short. Maybe mid to lower trap is chronically long, etc. so, are we going to make much for changes in these types of conditions? Maybe you can, but if anything can help this individual manage some ongoing discomfort that they might be experiencing.

When looking at inspection and common conditions that we see in athletics, seeing an AC sprain is pretty common, especially if you are dealing with collision and contact sports. AC sprains, I like this picture because we can see what he looks like on our gross anatomy view as compared to what he

might look like on his radiographic imaging. Here we have on his R-view in right, his left shoulder, we see an AC joint that looks fairly healthy. Just a little bit of a bump, you can see that maybe he is a little bit older. Maybe he got a little bit of osteoarthritis there. When we look at the right-hand side, if we can see the skin shadow and feel free to pause this and blow it up if you need to. If you look at the skin shadow, you can see that it is significantly different as compared to his other side. If we were to take an X-ray of this individual, which I clearly would advise you to because a fracture could be involved, we will talk about that later. We can clearly see that this is a grade 3 AC sprain, maybe even more significant than that. But at least a grade 3 AC sprain, which we were going to talk about on the next slide, these different grades. We can see that the integrity of the acromioclavicular joint and the coracle clavicular joints are disrupted.

Let us talk about the different grades of AC joints before moving on past our inspection. We have a normal healthy scapular shoulder complex on the left-hand side. Now, typically, and quite commonly, we talked about 3 grades of AC sprains. We generally rarely talk about grades 4, 5, and 6. But we generally talk about grades 1, 2, and 3. Grade 1, would be a mild sprain of the AC joint. The AC ligaments are still intact, and we would not see an elevation on our gross inspection on a type 2 AC sprain. The acromioclavicular ligament is disrupted as we see in this picture, but the coracle clavicular ligaments are still intact, which is maintaining a healthy position of the clavicle. In these type 2 sprains, there is still not any elevation of the distal clavicle. However, if you take a weighted X-ray, which is the second step of taking these anterior views of AC sprain diagnosis. You take an unweighted X-ray, you take a weighted X-ray, especially if there is no elevation. If there is elevation, you do not need to take away the X-ray, it is already unstable. We will get to that here in a bit.

The reason why we take a weighted X-ray is to determine whether it is a type 1 or type 2. If we weigh them, we strap, we do not have them hold on to a dumbbell or a bag. We do not have them hold on to it because the increased muscle tone potentially will increase the muscle tone of the shoulder which could cause a false stabilization of the AC joint. We want to hang it, we want to strap it around the wrist, and we want a fair amount of weight literature as variances on how much weight we will put around the wrist. It will depend on whether it is a child, whether it is a grandma and grandpa, or a 28-year-old athlete. We want to weigh them and distract the entire shoulder complex inferiorly. If we see an increased gapping of the AC joint, as well as the distance between the clavicle and the coracoid in an X-ray, then we can assume that there is a type 2.

Then, grade 3s. Grade 3 AC sprains, as we saw in the previous picture, this one right here. Clearly, when we look at that, that patient in our gross anatomy evaluation, we are going to see that the distal clavicle is elevated. We again, want to take X-rays. You do not need to do weighted ones for a grade 3 because we know that these ligament structures are disrupted because we can visibly see an elevation, but we do want to take an X-ray because trauma was involved. One of the more common indications, especially for sports chiropractors to take an X-ray. Because of the trauma, there could have been a fracture involved as well and I will show you an X-ray or a case later.

What about these other 3 types of AC sprain? We have type 4, where it is significant or severe. Sometimes these types 1, 2, and 3 AC Sprains are referred to as mild, for type 1, moderate for type 2, and severe AC sprains for type 3. A type 4 is a severe AC sprain, but the clavicle migrates. It migrates posterior, so there might have been a force from anterior to posterior and locking almost the clavicle on the posterior aspect behind the acromion process and sometimes within the belly of the supraspinatus and the trapezius muscles. Type 5 is a significant separation. We can see this high elevation, the distal clavicle, the SC joints are often involved with a sprain of this, and the scapula is depressed, quite significantly. I have seen one of these. It was a snowboarder who was snowboarding in Montana and he had a significant injury, he fell on his shoulder. His shoulder was very depressed at the point, at the

acromion process, and the clavicle was quite elevated. He went to the emergency room and the emergency room doctor told him that his clavicle was out of place, and he needs to see a chiropractor have it put back in place. Of course, I have never seen this gentleman before, but I had seen his wife before, so his wife recommended myself. He came in, and he told me a story, I took X-rays just to rule out fracture and I said, "This is not something that can be adjusted. That may involve surgery."

We will talk about AC sprains and how to manage them. This was a case that I saw almost 20 years ago. Back then, we were still doing surgeries for significant AC sprains like this. Type 6 AC sprain. This is where the distal clavicle again, has a severe sprain, a severe tear of a distal clavicle, and a clavicle migrates anteriorly and may get locked underneath the pec minor depending on the mechanism of injury. You can imagine that if the elbow or the shoulder was in horizontal extension and abduction that the clavicle could migrate anteriorly and become lodged under the pec minor. Just to review 6th grades. The first 3 are the ones that you really need to wrap your head around. You might see a type 5. Otherwise, I have never seen the type 4, type 6, and probably never will.

When I am taking films of my patients, sometimes I do a left film or a right film because I think it is important for me to understand and be able to compare and contrast the different joints because sometimes they do look uniquely different, especially in my pediatric films. But one of the things to consider when we are looking at these films is that when the underside of the clavicle if you follow that, it should go almost straight to the underside of the acromion process. As compared to the AC sprain joint, there is clearly a step in this indication. I do not know if these are weighted films. If they are weighted films, this could be a high grade, too. I am guessing, It is not weighted because it has no mention of this film being weighted. It is probably a grade 3 AC sprain.

Here is another case I want you to consider. This was one of my patients quite some time ago. He is a high-level volleyball player and he presented with ongoing right shoulder pain especially after striking a volleyball. He was right-handed. I want you to write down a few things that you see. You can see that there is a fair amount of space different from the left side to the right side, it is a little dark on this side, but you must take my word for it that there is quite a bit of a larger space in the right side compared to the left. That could be an indication of scoliosis. There is another indication of scoliosis on this picture, and it is skin folds. If we look at the skin fold on the left-hand side, we have one major skin fold and a real minor one here. If you look at the right, we have a smaller major one here. More of a major one and another major one. You clearly see there are more skin folds on one side than the other, another indication of scoliosis. Not to mention that his shoulder is lower on the right side than the left. But he is right-handed and so, it is not unusual to see the dominant shoulder being a bit depressed as compared to the left-hand side. What else do we see? Some people talk about hypertrophy here, which is not hypertrophy what the problem is, I am just being a little tricky here with you. The infraspinatus is atrophied. We have atrophy of the infraspinatus and again, he was a high-level volleyball player, a very fit individual, and not uncommon to ballistic overhead athletes. Such as picture volleyball players may develop a cyst in the suprascapular notch causing atrophy and diminished axonal flow of the suprascapular nerve. This is not an uncommon finding, this is infraspinatus atrophy. Again, ballistic overhead athletes. This individual complained of chronic right shoulder pain, especially after striking a volleyball and it turned out that before he came to see me, he went to go see an orthopedist. An orthopedist did an MRI, and they diagnosed him with a full-thickness rotator cuff tear. A full-thickness rotator cuff tear. We are going to come back and visit that term in our conditions about a full thickness rotator cuff tear and what does that mean.

Long story short, we are able to treat him, he was scheduled for surgery. He was supposed to have surgery within a 2-week period, and I had mentioned that I would be happy to give him another opinion or help him out. Well, at the time of playing volleyball with him, he said that he was cool with getting that surgically corrected and he was going to move in that direction. Well, about 3 days later, I missed a volleyball practice, 3 days later, I see him in my practice the next day and I thought, "Oh, he had a change of heart. He just wants another opinion." Well, he came in my office with a cast on his left hand. In the practice that I had missed, he went up to block and while he was blocking, he took a volleyball strike right on the end of his finger, shattering part of his hand. Here, he was going to be in a cast now on the left-hand side for 4 to 6 weeks and then they sling and swathe if he had this surgery on the right hand. It is hard to take care of grooming yourself. If you are unable to utilize either of your hands, so he postponed the surgery for at least 4 weeks up to 6 weeks, and I am talking about the rotator cuff surgery. He said "I am all yours for 4 weeks. Let us see what you can do." Well, after about 2 weeks of care, we cancelled his rotator cuff surgery because he was doing so well. We will talk about why he responded so well. It was not because I did great care. It was because it was a particular type of injury that maybe at that time, probably would not have responded well to surgery anyway and probably would have responded better to conservative care, which is what we did.

What do we see in this case? You can pause the video here. But if this individual came off a football field hockey and there was some trauma involved, you might consider a few diagnoses. Here are some considerations. What we see is he is holding this arm so, this right arm is probably the injured side. There are going to be some and clearly, there are some differences on that right side compared to the left side. Some of you know right away what it is but if you have not seen this walk up to you, you might still wonder what is going on. Some considerations, look like his pec is different than the other side. Yes, maybe, but that is not the problem. What about a clavicle fracture? Yes, maybe, but that is not quite the problem. Some things to consider here is he is got a bit of a sulcus sign underneath the acromion process. The acromion process is very prominent compared to the other side, he has a bit of a sulcus sign underneath the acromion process.

This is a real typical presentation of a glenohumeral luxation. A glenohumeral luxation. Most likely, the humeral head dislocated anteriorly and inferiorly. It is probably sitting underneath that coracoid process and that is why we have this vacancy right here. If you were to go in and palpate right here, the humeral head just would not be there as compared to palpating underneath the acromion process on the other side. If you were to palpate anteriorly, you would palpate in the osseous structure there, where you would not find that same osseous structure underneath the left side. This individual most likely has a glenohumeral dislocation or luxation. Something that we want to do certainly on inspection, is to palpate. We have already talked about some palpation findings already. One of the things that we want to palpate is this space right here, the lateral deltoid. We want to just lightly touch it and make sure he has sensation there and then touch both sides and make sure that the sensation is equal. If it is numb here, if he has diminished sensation there, that could be silver dollar sign. A silver dollar is a structure about this big, about 2 to 3 inches in diameter, and the axillary nerve provides sensation to the lateral deltoid in the space. If he has a humerus fracture, either with or without luxation, he would likely have what is called silver dollar sign diminished sensation. That is one thing that you always want to do before you do much more of an examination. If so, you sling and swathe them and you get them off to a hospital somewhere. The next thing regarding inspection and palpation is palpating for distal pulses and making sure he has distal pulses on the radial pulses. Make sure he has a capillary refill, and he has a good station in his fingers.

On palpation so, remember these HIPPIRONILS, after inspection now, we are going to palpate. When we are palpating, we want to palpate soft tissues and we want to palpate osseous tissues. Clearly, when we are looking at the SC joint or looking at their shoulder complex, we want to palpate the SC joint all along the clavicle. In the AC joint, osseous structures of the rest of the shoulder complex, and all these soft tissues, including the soft tissues that are within the axilla. It seems like some doctors tend to skip opening that axilla and palpating the axilla in the structures within it. There is a lot that could be going on in that area and that could be causing your patient's shoulder pain. Palpating is important. You are going to find that when we talk about orthopedics a little bit that palpating the AC joint, for example, we can see that this individual clearly has a grade 3 AC sprain. This is going to be tender, and palpation of the AC joint is one of the most sensitive tests. When I talk about sensitivity and specificity, it is one of the most sensitive tests we have, but it is not very specific to anything, and we will talk about that when we get to this slide.

Same with this patient, if you look on, if you want to blow up the picture, you sure can. But when we are dealing with a case such as this, which is a rather rare case, and you can see that he has a fracture of the distal clavicle. It is not commonly fracture. If the clavicle is going to fracture, it is usually that middle third. But here we have a distal fracture, and it is important to take an X-ray when we have trauma. This reminds me of a case that I had when I was in Mexico in 1998 for the all-Mexican Juvenile Olympic Games. There was a young girl that came in and she was not happy. She did not speak any English and I did not speak any Spanish. I was depending on a Spanish-speaking Mexican physio to help me and as we are trying to find the lower pain, I asked where it was, and she pointed to the AC joint. I want to start a little bit away from it. I was palpating the SC joint and working my way up to the clavicle and when I got to the distal clavicle vast when she did not like me to palpate that area. AC palpation is highly sensitive, but it is not very specific. What does this mean? The mechanism of injury was that she was pushed and fell on another body, as well as her body fell onto her shoulder so, that is a lot of mass. She does not recall and hears any popping or clicking sensations at the time of the injury. It was hard to get that translated through anyway.

With this individual, she had exquisite AC tenderness. One would think for sure; an AC Sprain and it could be a grade 2 because I do not really see a lot of elevation. We could do a weighted X-ray, but I continued with my examination. I went to percussion. When we percuss, we do not want to percuss directly over where the pain is because we already know that it hurts. We want to percuss elsewhere. We want to create an osseous vibration. I started percussing down at the SC joint and when I percuss down here, she said it hurt. We must clearly ask where it hurt. Did it hurt where I percussed? She said, "No, no. It hurt to back up in here again." I percuss on the other SC joint and there was no radiation to the AC. I came back to this one and percuss it one more time. It is always okay to do a test twice, just for confirmation and sure enough, it hurt here. Then, because she had percussive pain, if she had an AC sprain, percussion probably would not hurt. But if she had a fracture where that periosteum is involved, and the vibration is going to be very nociceptive. It is going to be very toxic and noxious to nociceptors. I am leaning now more towards a fracture and so, we sent her off. This is the end of this Mexican athlete's story. I send her off to the medical doctors to take an X-ray. The medical doctor said, they looked at her, they hardly touched her because I heard from the coach later. They hardly touched her, and they said, "No, she does not have a fracture. She does not need X-rays. Go back to the physiotherapist". Thankfully, the physiotherapist, they saw was the physiotherapist that I had helped me translate.

I see this athlete coming back, she is still unhappy. The coach is now with her, and the coach is mad. I went over to the physiotherapist and said, "What is going on?" The physiotherapist translated back to me saying that the medical doctor thinks she just contused her shoulder, or maybe sprained it, and does

not have a fracture. I looked at the physio and I said, "Do you agree with me or do not agree with me that she likely has a fracture?" The physiotherapist said, yes. The physiotherapist then referred to the medical doctors again for a diagnosis of fracture. They finally did take the X-ray, and this is almost an identical X-ray of what they found, is that she clearly did have a fracture. Now, when she came back, she and the coach were very happy. She was not all happy because they know what the problem was. They caught a bad injury, and she was in a sling and swath, and she was out of the games for the rest of the week. I was unhappy in that regard, but happy that we insisted on having an X-ray taken.

Your HIPPIRONILS flow instrumentation is something to consider, we can quantify pain. This image here, I granted this is not a shoulder, but you can understand that we can use this algometers. A device that measures and quantifies pain for a patient. Another way of using instrumentation is assessing for proprioception and we are going to demonstrate that in our rehabilitation part 2 of the shoulder case and then measuring girth. One example, and I am not really impressed with this orthopedic test, but there are orthopedic tests available saying that if you think your patient has a shoulder dislocation, you should take a tape measure and wrap it around the glenohumeral joint, and if this is larger than the non-injured side, they are probably dislocated. It bothers me quite a bit because I think if you are a competent clinician based on history, inspection of your patient, and some palpation, you should be able to identify that the glenohumeral joint is dislocated. You should not have to measure it. It is a lot of unnecessary movement of that shoulder to get this measurement where you could be reducing that shoulder at a much earlier time. But nonetheless, this is an example of instrumentation taking a cloth tape measure and measuring girth, so you can measure around the bicep as well for identifying maybe chronic thoracic outlet syndrome.

Moving on to the range of motion. When we perform a range of motion, we want to perform an active range of motion, first. Then, passive range of motion, and then maybe resisted range of motion. Once we start adding all that together, we are performing O'Donohue's test for the shoulder. Biomechanics again, I am going to refer you to the biomechanics module for what normal motion from the range of motion of the shoulder should be. But let us talk about a case here of abnormal shoulder. Let me turn off the volume. She has a normal range of motion on the right-hand side and if we look at the left-hand side, that does not look very normal. Let us go back and watch that one more time. On the right-hand side, she has a normal range of motion and a full range of motion. On the left-hand side, you can see that it is quite rough, and I just want to stop that right there. If you want to again, stop the film and write down some ideas and what you think your differential diagnosis would be, feel free to do that.

Some of our differential diagnoses of this athlete that we saw in Australia at our student clinic there, and we publish this case. Dr. Sivar and myself, along with some others at Murdoch University published this case. It is about a high school rower who had significant scoliosis as she was going through her adolescence. She ended up having this dyskinetic shoulder. One of the things that I do now for my range of motion assessment is I perform a range of motion like you just saw. Then, I add a second component. If I see dyskinesia or if I have a patient reporting pain during the range of motion, I then asked the patient to perform the range of motion again, but I have them co-contract or co-activate that region. For this patient, I had her co-contract her shoulder which involves conscious contraction of several different muscles. The entire rotator cuff complex, the mid trap, and pec minor. If we can track pec minor appropriately, it should turn down the tone a little bit and I hate saying that term, "turn down the tone" but it tends to make sense for most people. If we are contracting pec minor appropriately, it tends to diminish the tone of the upper trapezius and we do not get as much hip shoulder hiking. But let us look at this again. We have a normal range of motion, and we will let it play out this time. We have a dyskinetic shoulder. We are going to have her co-contract her shoulder and it is almost normal. It is almost normal, so, we will probably revisit this case when we talk about rehabilitation in part 2 of this

section. But this tells me that this patient is probably an ideal candidate for rehabilitation. Even though our differential diagnosis included dysplasia of the humeral head and dysplasia of the glenoid process, maybe her [inaudible] and her shoulder luxating or subluxing and reducing again, spontaneously. We took X-rays and if you read this case, if you go on PubMed and you type in Stark T, you will see where we publish this case, and you can see other videos including a fluoroscopy. We will talk a little bit more about that reference.

Then, we get in the orthopedic evaluations. Orthopedic evaluations. Man, there are so many tests that we can do for the shoulder. There is clearly a shorter list that we should be focusing on. This is just a short list that I generally tell my undergraduate students when they are taking the American boards. Just focus on these because these are the key test that the boards are focused on. Not necessarily the best test out there based upon sensitivity and specificity, but this is what the boards tend to focus on. Let us look at how we can identify what the best tests are. You are done with chiro school, you should have gone through orthopedic evaluation tests and hopefully, your instructors taught you about the sensitivity and specificity of assessments. Earlier, we are talking about acromioclavicular sprains, and we talked about palpation of the acromioclavicular joint. If they have tenderness at this AC joint, you can see that the sensitivity is almost perfect. It is 96% meaning, there is something wrong if they have tenderness at the AC joint 96% positive, 96% likely that there is a problem there, some sort of condition. But you can see the specificity is only 10%. In other words, there is a problem there, but we just do not know what it is. It could be an AC sprain and different severities of it. It could be osteolysis of the distal clavicle. It could be OA. It could be a long list of things. This is an example of how to read and understand sensitivity and specificity, and likelihood ratio. With likelihood ratios, we want to test it above one. But if it is way above one, like the lift-off subscapularis tests, often referred to as Gerber's lift-off test. You can see that it has a relatively okay sensitivity, but a good specificity. In other words, if they tested positive for this lift-off test, the likelihood of it being a problem is a strain or a tear of the subscapularis muscle. The likelihood ratio was high in that particular case. We do not want to get into research too detailed. You can do some more reading on your own about likelihood ratio, sensitivity, and specificity.

We are moving into the neurological or neurovascular component of our assessments, and this is where oftentimes, I might perform muscle testing. Manual muscle testing or using a hand-held dynamometer, H-H-D, hand-held dynamometer. You can see in the pictures that the provider here has the device that's between the stabilized patient and this patient pushing up, assessing shoulder abduction. This is a case where this instrument can measure and quantify how much force a person is able to produce an abduction compared to the other side. There are just several different positions here for internal rotation and external rotation. If you look in the mirror here, you can see she is performing a Gerber lift-off subscapularis test, but the doctor or the providers measuring how much force they are able to perform. In this picture over here, we talked about serratus anterior with some potential weakness if we see some medial border winging of the scapula and so, this is an example. There are many ways of testing serratus anterior. I find that this is more of an accurate way of testing it from my own experience. But it is hard to demonstrate that in this type of didactic lecture. Hopefully, if you have questions about that, you can either shoot me an email and I will give you my email here later. Or maybe see you at a hands-on lecture at some point in time.

In the neurological evaluation, we want to do sensation assessments for peripheral nerves and our spinal nerve roots and you should be able to have a good understanding of that already. Then, we move into imaging, if there is trauma, I take X-rays. It is pretty rare that I would have an athlete come in, complaining of a history of trauma. They have shoulder pain and did not take an X-ray. 9 times out of 10 for sure, I am going to be taking an X-ray especially, if they are youngsters and we will talk about why

when we get into a pediatric lecture here in just a few minutes. But, this is an X-ray of a youngster and we can clearly see that there are some growth plates here. When it comes to the shoulder, some of the latest closures of joint spaces or growth plates are within the shoulder complex. It does make a complex for us to come to a diagnosis conclusion of whether there was a fracture there or not. Then, as we finish our HIPPIRONILS flow, performing laboratory tests might be appropriate for some of your patients. Especially, if they have particular conditions that we think are causing shoulder complications such as gout and maybe they have an infection. Maybe they have some sort of crystalline appetite deposition disease, or maybe diabetes, rheumatoid arthritis, and then a special test. Special tests are one of the last things I do. It is to where I perform my motion palpation of the shoulder complex. Sometimes, I save my muscle testing in my handheld dynamometry for this and some other fitness types of tests.

To conclude this part 1, let us talk about some common shoulder conditions. We are about maybe two-thirds of the way through this part 1. Let us talk about AC joint injuries. We already talked a little bit about them in the different grades. You should remember there are 6 grades, and 3 more common ones. But typically, let us go through a few bullet points about AC joint injuries, as being one of our more common sports injuries. Historically, usually, there is trauma. Especially, to the point of the shoulder either hitting somebody or landing on the ground or the pitch causing an AC separation. Sometimes, there is overuse of an injury-causing this AC sprains FOOSH fall on an outstretched hand. If the acronym does not carry over across languages, FOOSH mechanism is a fall on an outstretched hand that could cause an AC sprain. Oftentimes, athletes might come in and say, "I was diagnosed with a separated shoulder." When they talk about a separated shoulder, they are usually talking about an AC sprain. When you are looking at the athlete again, we talked about a step deformity. If we see a step deformity what grade could it be? If we see it, it is probably a grade 3 or worse. If you do not see it, it could still be a grade 1 or grade. What do we do to differentiate the two? We take an X-ray, a weighted X-ray. We are always going to take an X-ray on an AC sprain anyway. We are going to take a weighted X-ray if we do not see step deformity because we need to differentiate between grade 1 and grade 2.

With palpation clearly, there is going to be a lot of tenderness at the AC joint. We talked about how sensitive that is. There may be AC laxity. I am not really a fan of this bullet point. Because if they have some significant tenderness of the AC joint, they are not going to let you get in there and wiggle it around and identify whether there is laxity there or not. We want to take an x-ray and we want to weigh it if we think that there might be a grade 2. In regard to managing it, PRICE it. Now, I know the PRICE. Protect, rest, ice, compression, and elevate. It is an acronym hoping it carries across through languages but in case it does not, PRICE stands for Protect, Rest, Ice, Compress, and Elevate. I know some of you are probably rolling your eyes that we do not PRICE or RICE anything anymore. The reason why we have navigated away from it in literature, is because of the Icing, and it does not make sense to ice for inflammation management for an injury. I agree, I do not think I have ever iced for inflammation management. I have generally applied ice for pain mitigation. When it comes to evidence for ice for pain mitigation, the evidence is still good. We know from contemporary literature that icing for inflammation management maybe is not that good. So, I still tend to lean towards PRICE in it, especially with acute injuries and we want to protect it.

This is an example of a Kenny Howard or a modified Kenny Howard brace where we have got a weight over that injured AC joint. The arm is being supported upwards. There is tension in this band right here. Pulling the arm upward so that we can unweight the scapula and put more weight because of this strap over the top of the distal clavicle. I used to recommend these quite a bit. Then, I would tape, as well. When they are in the shower and they must take the Kenny Howard off and sometimes even sleeping, the tape would do some work to keep that AC stable. The reason why I did that was I was optimistic, keeping my fingers crossed, optimistic that maybe that clavicle will settle down. Maybe it will heal back

to the acromion process and after almost 30 years of practice, I do not think I have ever seen a distal clavicle heal back to the acromion process where there was a lot of stability.

The last 10-15 years, I have told my AC sprain, especially my grade 3s, my athletes who have had a grade 3 AC sprain to just understand that they're probably going to have an ugly shoulder for the rest of their life. That shoulder is probably never going to look even again and if you get that in their head and just have them have some sort of comfort level with that, they tend to tolerate the fact that that is probably going to be the outcome. We will keep our fingers crossed that they do have some stability, but it may not happen. These types of braces though, I have noticed that throughout the day depending on what are doing throughout the day, whether they are a student or they are going back to work, it does provide them with some symptomatic relief. It may not help close and bring that clavicle down and encourage healing there, but it does seem to offer some symptomatic relief.

Back in my earlier days, like this snowboarder that came in from Montana with this class 5 AC sprain. He did go in and he had surgery for that. We are not suggesting surgery much nowadays, but that was 20 plus years ago, 25 years ago. Back then, we are just finding that the long-term outcomes regarding chronic pain and overall function are just not that great. But historically, if you are looking at old x-rays of somebody, you might see pins, you might see other types of stabilizing bars, you might see K-wires, and you might even have a history where the bicep tendon was split off and ran up through the coracoid process into the clavicle. There is several different ways in which these have been stabilized. One thing I have done is to create protective pads for some of my players, especially my ice hockey players. My ice hockey players, not uncommon, they go to check somebody, and they end up spraining their own AC joint. I have never applied a pad like this, this just looks horribly uncomfortable having a strap underneath your armpit. But what I have done, is created a similar-looking pad just with a cushion and cut out a hole, a donut where the AC is. Then, I might place a couple of them on top of each other to create some thickness, and then, the ice hockey pads would go over the top of that and it would prevent the ice hockey pad from rubbing on this elevated clavicle, which really did help substantially and got my guys back to playing hockey faster.

Clavicle fractures are very common in athletics. As we mentioned earlier, common location for these fractures to occur is the middle third because the lateral third and the medial third are stable regarding all those ligaments stabilizing it. Back in the day as well, there used to be a surgical intervention to help stabilize this, and then after that or even less severe clavicle sprains, a Figure-8 brace. I have put several athletes in Figure-8 braces. Now, that the current management is to put them in a sling and swath and that is it. The Figure-8 braces seem to not be that much beneficial to these individuals' clavicle fractures. If you just sling and swath them after a couple of weeks, they start developing some stability if they are being good about limiting their motion.

Glenohumeral instability is very, very common, especially in our younger athletes. Let us talk a little bit about glenohumeral instability in the different components of them. They may have unidirectional instability or multidirectional, meaning the ball and socket will just move in one direction and have just instability in one direction. Multidirectional means, that it is unstable in a lot of different directions. In the old days, we used to talk about acronyms for unidirectional and multi-directional. Let me go back. TUBS, Traumatic, Unidirectional, Bankart is what the B stands for, and S stands for surgical. A TUBS injury was usually a result of a traumatic injury and usually resulted in a luxation or a dislocation. As traumatic, unidirectional, and unilateral meaning one shoulder, and a Bankart lesion were not uncommon. I will show you Bankart lesions here in a bit in regard to dislocations and might require surgery to correct that.

The other option or other consideration for instability of the shoulder is an AMBRE. Where A stands for atraumatic, M stands for multidirectional, inferior, anterior, posterior instabilities, B stands for bilateral, R stands for rehab. This patient tends to respond better to rehab than those that have luxated and I can speak eloquently to shoulder dislocations in a second. Then, I stand for an inferior shift. If the athlete responds poorly to rehabilitation, they may require a capsular shift which is done surgical to stabilize that shoulder. Anterior and inferior is the most common direction, in which the humeral head dislocates or has instability. Excessive range of motion or a FOOSH fall on an outstretched hand is a common mechanism for an unstable shoulder. It can easily become chronic and a dead arm syndrome. A dead arm syndrome, when I was playing competitive volleyball, I had dead arm syndrome for quite some time until I went through some rehabilitation. But every time I would go up and strike with my right hand, especially if I was playing the right-hand side, and I would have to turn my hand in, to cut down the line, and if you play volleyball, you know what that means. My arm would go numb, and I was hoping that I scored because then we could probably stop until I went around and assume the serving position. But a dead arm position might be indicative of a chronic thoracic outlet syndrome or other chronic conditions within the shoulder complex.

A deep dive and a lot of clinical examination are necessary to identify the problem with this individual. The patient might report a popping sensation when the mechanism of injury occurs. It could be a subluxation or a luxation. As we have described earlier, we will talk about luxation later. When you observe this patient, the patient might move when they walk, they may not swing their arm as much on that side. When they are going through ranges of motion again, they are going to be probably limiting their motion. When we take an x-ray of somebody with an unstable shoulder, especially if they have a history of a luxation, they may have what's called a Bankart lesion and or a Hill Sachs lesion. Two common fractures. If there was a test after test, this would most likely be one of those test questions. But the 2 more common fractures are associated with luxation of a shoulder complex, particularly the glenohumeral joint. Then palpating, when we are palpating the rotator cuff insertions, it might be rather tender. How do we access the rotator cuff tendon, I'm going to stand on my tippy toes here a little bit if we internally rotate our shoulder. We are internally rotating; I have my hand behind my back right now. The very front part of the humeral head is where the rotator cuff conjoined tendon tends to insert, is right in that general area. That area might be rather sensitive. We clearly want to assess the shoulder in multiple directions, and we want to test distal pulses and sensation to rule in or rule out some other nerve complex complications.

You may want to stop and write down these YouTube video URLs. These videos represent several glenohumeral dislocations. If you are a little squeamish, you may want to pass looking at some of these videos. But there are some ways of reducing these shoulders that are better than others. One way is the Coker maneuver, so it is this one right here. They refer to as the Cunningham technique, but it is referred to as a Coker Maneuver. Almost every shoulder that I have reduced with the exception of my own shoulder dislocation that I had about a year and a half ago, almost every other shoulder dislocation I have ever reduced, was done through this Coker Maneuver and so take a look at this. This is done in a clinical environment. Some of them are done out in a grassy area or in the basement of a house and so keep in mind that some of these, and I put little comments on here about horrible patient movement and this technique I would not recommend it. If you have time to only watch one video, clearly watch this one. This is probably the clinical technique that you would want to consider.

Regarding Chronic instability, some clinical things that we tend to see is the sulcus sign. Here we have an individual. There is a downward pressure on the humerus. The clinician here is just pulling down on the humerus and we see the humeral head being pulled inferiorly, so if you have the acromion process here, the humeral head is being pulled inferiorly, which creates then a vacuum or a sulcus, right where

the arrow is. This sulcus sign is maybe indicative of chronic instability. Here we have a Hill Sachs lesion which is a little hatchet formation or fracture of the humeral head and here we have a Bankart lesion which is the anterior aspect of the glenoid process and as that humerus was being forced anteriorly, it tended to take a piece of the anterior glenoid process. In this view, we have the Bankart lesion and here with posteriorly, we see the Hill-Sachs deformity. In fact, there is two of them and there are some theories in which these Hill-Sachs are formed. One theory is that as the humeral head is blasting past the glenoid process when it slams back into the glenoid process, that causes a fracture. Well, I do not know how far that humeral head must go forward for it to slam back. It just seems a little ludicrous if you ask me. Mine certainly, didn't do that. I think what more likely happens is these Hill-Sachs deformities are more likely caused from a chronic luxation. It was left out of joint too long and the athlete might have been moved around a little bit in which the muscles are in spasm, the ligaments are trying to hold it tight and therefore this part of the humeral head is grinding on the anterior glenoid process and that's probably causing little micro fractures of the humeral head. It is my own theory. I have read another literature as well as it being a possible theory rather than this dynamic recoil.

Let us talk about SLAP Lesions. SLAP Lesions, SLAP is an acronym that stands for Superior, Labral, Anterior to Posterior. It is the superior part of the glenohumeral joint that has a pathology and it tends to start anteriorly and migrate its way posteriorly as it becomes worse. Generally, the biceps tendon, which is this structure right here, is involved with the pathology and tends to worsen with eccentric biceps work. In other words, a lengthening contraction as the biceps is loaded and if it is being forced to lengthen, it tends to exacerbate pain, there is an orthopedic tests called "speeds test", that does just that. There are a number of different causes or grades of SLAP lesions and it depends on the literature you're looking at. But this figure reference 4 different grades of SLAP Lesions, this one being the first one where there is just a little bit of degradation or fibrillation of the proximal biceps tendon as it inserts into the labrum. The second one is we are starting to get some tearing of the labrum. The third, Grade 3, we start seeing a bucket handle tear of the labrum and this is where the shoulder might have some significant clunking movement similar to what we saw in that one video earlier, as it goes through a range of motion. Then in grade 4, we start seeing not just a bucket handle tear, but we start seeing tearing down the longitudinal part of the biceps tendon. Now, what literature says, is the most common presentation, is this type 2. Why is that? Because these type ones might be a real mild insignificant complaint of the athlete, not significant enough to really encourage them to go see a provider. What we typically see in our offices is this progression to type 2, where we already see some injury and I clearly do not like seeing SLAP injuries. I try to rehab the heck out of these if the shoulder is not presenting with like a bucket handle tear, where there is a lot of clunking and dyskinesia of the shoulder. I try hard to rehab them and we will talk about some of the rehabilitation interventions for SLAP lesions and other shoulder conditions as we get into part 2.

Biceps tendinopathy goes hand in hand with the the SLAP injuries. Typically, what we see is that they might have a history of a rotator cuff tear. PMH stands for Past, Medical, History. They might have had a past medical history of a rotator cuff tear, that then now has resulted in biceps tendinopathy. It could be chronic, it could be an acute onset, it could be caused by a forced range of motion, either into external rotation or forced horizontal extension of the glenohumeral joint and usually while it is under load, such as a rugby forward, trying to catch somebody as they're running past them. As we observe our athlete, they might have some altered mechanics over the shoulder, moving it a little bit differently as compared to the healthy shoulder. In regard to inflammation, this bullet point, it came from this particular reference, you may or may not see inflammation like visibly see it. Depending on where that tear is and how lean they are. In regard to palpation clearly, there is going to be some tenderness, maybe over that bicipital groove, we want to make sure that the transverse ligament is intact. If the transverse ligament is not intact, if it has been torn, the biceps tendon can luxate, and it usually will luxate immediately.

Especially, as the humerus is horizontally extended and externally rotated, and I have only seen one of those in one of my ice hockey players.

Now, I know there is several my colleagues out there that are adjusting the bicep tendon, on a lot of patients and I apologize, I put quotations around it because I just do not get it. I do not understand how you can adjust the biceps tendon back in the groove. If the transverse ligament is intact, that biceps tendon should not be going anywhere and maybe it is time to go back and look at our cadavers and see how tight that groove is when that transverse ligament is intact. This hockey player that had a dislocated biceps tendon was because he had an acute rupture of the transverse ligament. It dislocated when we were taking his jersey off and then, we brought him into internal rotation and abduction, and we were able to manipulate the biceps tendon back into the groove and I did my best stabilizing it with some tape. But that was a challenge, we just told him to not horizontally extend and externally rotate or else that biceps tendon is going to pop immediately again. Then, he did have to have a surgery. He was already getting a full ride scholarship to a division 1 college to play ice hockey, which is a big deal here in the USA. I can talk further about that, but if you have any questions, feel free to email me on that. What we are going to do in our examination, we are probably going to see some muscle weakness, especially when testing the biceps.

Rotator cuff tendon apathy? Very common. One of the more common things you are going to see in our athletes and what commonly happens is, it is more of an insidious onset. It starts a little bit slower. It is generally not in acute tear unless they fell on an outstretched hand or went to tackle somebody. In their past medical history, they might have had a previous diagnosis of an impingement or some previous medical history of instability. For observation, when we were looking at our athletes, their range of motion is going to be limited. They might hike their shoulder because they do not want to abduct their glenohumeral joint. There might be some atrophy as we saw in the earlier inspection athlete where their infraspinatus was atrophied. When we palpate, there is probably going to be some tenderness right over that rotator cuff insertion. Remember how to do that? We anteriorly rotate the humerus and palpate the anterior aspect of the humeral head and there might be some tenderness in other spaces around the shoulder complex.

Orthopedic tests, you could probably name off more Orthopedic test of rotator cuff tendon apathy than me, but be sure that we have good sensitivity and specificity when we are doing them. Go ahead and do a deeper dive on that. Managing rotator cuff tendon apathy, it depends on whether there is a full thickness tear and whether there is separation. We will talk a little bit about that here. One of the mechanisms for rotator cuff strains is an excessive eccentric motion and here we see a picture of a water polo athlete getting ready to throw a ball and the eccentric motion, for a subscapularis tear, as he is trying to slow down that cocking phase, the subscapularis is contracting intense to slow down that particular motion. Then, when he starts concentrically contracting subscapularis and other internal rotators, he is going to throw the ball. Once he releases the ball, the external rotators now, are eccentrically to try to decelerate that humeral internal rotation. These excessive eccentric motions or muscle contractions seem to be contributors to rotator cuff strains, trauma certainly can be a component of it. We again see swelling, if there is a lot of muscle mass and other mass around their shoulder, they are probably not going to see much for swelling. However, it is something that we should be looking forward or look in to. When we are palpating, the course again that they were going to have tenderness at these rotator cuff insertions.

A recent publication, in fact this just came out this month, December of 2020. They looked at a 2-year follow-up for rotator cuff tears and whether they were managed conservatively or not, the conclusion is here, and you can read it on your own. But if I were to paraphrase it, they are saying every rotator cuff tear unless it was a full thickness tear, and I want to qualify that. What they said in conclusion was, if it

was a full thickness tear or if it was not a full thickness tear, if it was a strain, it should be rehabbed. It should go through a solid course of shoulder rehabilitation, and even if that rehabilitation fails in a 2-year follow-up, these individuals were still doing pretty good compared to those that had surgery. Their conclusion was, if it is not a full thickness tear, you should consider rehabilitation and even if the rehabilitation fails, they probably should not have surgery. They did discuss though that if it is a full thickness rotator cuff tear, that surgery may yield superior improvements.

Let me talk about full thickness rotator cuff tears. When I am looking at an MRI of a rotator cuff tear, it is one thing for me to read the report and they say it is a full thickness tear. What I want to know is if the entire conjoined tendon was torn, the entire conjoined tendon, and whether there was separation in that tear. If we are looking down at the top of the conjoined tendon a full thickness tear, and if you can see my finger going through this tendon, that is a full thickness tear. It does not mean the whole width is torn. It means that there is a tear, going through the thickness of the conjoined tendon not necessarily the entire width of it, so there could still be a lot of attachment of the rotator cuff to the humerus. That is a full thickness tear, it is not a full width tear. When it is full thickness and full-width tear, then we might start seeing some separation and it might get wider and wider, and when we have a wide mean, that's what I start looking for. Is the report of how wide that separation is, there is a small tear, there is a moderate tear, there is large tears, and there are massive tears. What the literature is saying is that large tears, a 3-centimeter gap, that is when you should start considering surgery. If it is a small or a moderate tear, 1, 2 centimetres of separation, it will probably heal with some slinging and swatting, some good nutrition, some cross friction massage, and some other therapies to create good scar tissue so that it lays back down on the humeral head and we have a good outcome. The way I manage it like I have mentioned earlier, I am not afraid to PRICE it. Ice for that pain mitigation, not for inflammation. If a tear is larger than 3 cm, I am probably going to refer them off for surgical consult. If it is smaller, depending on the athletes and the individual, there are a million-dollar athlete or probably maybe they are going to send them in for a surgical consult as well because we might need to get them back faster.

Of course, some other therapies that we can do for rotator cuff tears are myofascial release technique, that's what MRT stands for. We are maybe going to adjust the rest of the shoulder complex or probably going to stay away from manipulating the glenohumeral joint for a little while then maybe we want to consider making sure the rest the joints are working the way that they are supposed to. Some other physical therapies for pain mitigation and healing potential and then, we rehab the heck out of that shoulder, and we will talk about that in part 2.

Shoulder impingement. I think this might be our last condition. With shoulder impingement again, common. They oftentimes precede a rotator cuff tear. They are usually chronic. Oftentimes seen in overhead athletes, surely by definition, they have painful abduction arcs. They might have some tenderness of the rotator cuff which might be some early indication of some rotator cuff tendon atrophy as well and you will probably list off a long list of Orthopedic tests that have good sensitivity and specificity for shoulder impingement.

Thoracic outlet syndrome. A lot of things can cause thoracic outlet syndrome and hence, the word syndrome. Syndrome is a collection of signs and symptoms that are manifesting with shoulder pain and sometimes odd arm conditions. Historically, and maybe upon radiographic examination, you notice that they have cervical ribs in the lower cervical spine vertebra. Maybe they have elongated TPS these by literature, have shown to predispose 12 TOS types of symptoms. Distally, they might complain of tingling and numbness in the distal part of their hand. X-rays may show these C7, findings that we mentioned earlier, poor posture, my experience is that this poor posture that we saw earlier does predispose them to TOS types of symptoms. Upon further examination, we might see a decrease pulse, some altered sensation, and joint edema. I cannot recall ever seeing joint edema with any of my patients with TOS

diagnosis. There is a long list of Orthopedic tests of Alan's test and Coastal clavicular Test. Be sure you are looking at the sensitivity and specificity of these tests before you are performing them.

In regard to managing them, it depends on really what the cause is. The cause is an elongated TP of T1 or cervical ribs, what are you going to do about that? Well, we can probably still try it, a course of conservative management. Maybe there is some muscle tension, maybe it is anterior scalenus syndrome that is causing this outlet that is associated with these elongated TPs or maybe some myofascial release work over the anterior and middle scalene might be appropriate, some physiotherapy, maybe some adjusting might be appropriate to manage these patients.

Last couple slides on Pediatrics. This is a literature that I'm going to try to include for you to read. I thought it was a good article, if you have not jumped into pediatric shoulder conditions much, this was a good concise piece of literature. They talk about overuse injuries and chronic injuries of Pediatrics and acute injuries. They say that overuse injuries predominate over your more acute traumatic injuries. In other words, are more common. 60% of all sports injuries in youth, are from overuse. They tend to be osseous and soft tissue in nature and radiographs should be considered to rule out trauma to the vices. As we see in this picture and a comparison, I take pictures or x-rays images of both shoulders, so that I can compare especially these youngsters because these vices honestly, they just freaked me out until I can look at what a normal physis looks like, it always looks bad to me. Be sure to take bilateral films. These overuse injuries in Pediatrics tend to be more prominent in females. However, 50% of these overuse injuries can be prevented and so, if we look at some of the causes of shoulder injuries in our youth, it is usually due to volume and too much activity or too much volume, too many pitches, too many volleyball hits, things like that. Some predictors that we might appreciate in our children, is that they will present with shoulder pain, maybe some complained of "My shoulder feels tired, it feels fatigue." They probably won't say fatigue, they would probably say tired and then, when you're looking at their baseball throws or their volleyball hits for example or netball throws, you will probably notice that they're not throwing as hard or they are throwing slower, that might be an indication that they're overtraining and they're starting to develop some early symptoms of an injury.

Little League shoulder, you may have heard of Little League Elbow, there is something called Little League Shoulder and that is what this is. It is a small little fracture of the physis of the shoulder and then of course, anterior instability and multi-directional instability can be noted, most likely with the multi-directional instability and a sulcus sign that we saw as we pull down on the humerus, I saw that in the children far more often than I saw in adults, and if it is equal on both sides, they just might have an AMBRE, a multi-directional instability of both shoulders and maybe they will grow out of it. But clearly, it would want to start stabilizing the shoulder complex and then eventually start strengthening it.

Let us talk about acute injuries of our Pediatrics. When we see an acute injury of a youngster, we might want to think of sprain or fracture. They tend to be more common in our youngsters, they have sprain or fracture as compared to strains. Now depending on the school that you go to, some teachers will just say sprain/strain or strain/sprain. They say it as if it is one word and if you know me, you know that drives me absolutely bananas because clearly it is different anatomy. A strain is different than a sprain anatomically. Sometimes the mechanism of injury is different between a strain and a sprain. Oftentimes, the treatment is different between a strain and a sprain. This statement right here, is another reason why we must call it like it is, it is either a sprain or it is a strain. Sometimes it could be both, clearly, sometimes could be both. But stop saying, sprain/strain, it drives me crazy.

With our children, often times, we may see a sprain over a strain, and we should think about fractures. Looking at the proximal humerus fracture, and that is what we see in this film right here, you can see that the proximal humerus is fractured. In this individual, what did we call when we were talking about

luxations earlier and we tested the sensation of the lateral aspect of the deltoid about the size of a silver dollar sign. This individual, this youngster right here, probably presented with silver dollar sign. It was numb right here. In that case, sometimes these cases when they present to you, it looks like a shoulder dislocation. That is why you still palpate though, when you palpate under the acromion process, there is going to be a lot of bone there, still most likely, which means it is not dislocated and then you're going to help touch the skin, and sure enough there might be some numbness and paresthesia there, some tingling. But usually, numbness and hence a silver dollar sign. It is fractured, you stabilize them, treat for shock and you get them off to the hospital.

Proximal humerus fractures. Clavicle fractures are fairly common in our youngsters, as they are throwing their bodies around the football fields and something to keep in mind, in regard to fractures of the clavicle is one of the final bones that is going to fully ossify as these youngsters is growing up. It tends not to ossify until they are in their early 20s. When you are taking these x-rays, do not be fooled by a growth plate on the distal, especially the distal aspect of the clavicle. As we mentioned earlier, the medial lateral clavicles are stable. It is the middle part of the clavicle that tends to fracture on the middle part of it. Mechanism of injury usually, for these clavicle fractures is a fall on a shoulder or fall on an outstretched hand that drives energy into that clavicle and fractures that. If they do not fracture their clavicle, some of the sprains they might experience, might be an AC sprain, in which we have talked about in a sternoclavicular sprain.

That concludes our introduction and includes our clinical examination and concludes our conditions discussion. Part 2, we will talk about shoulder functional assessment and rehabilitation.

[END]