

ICSC Lower Extremity Module 5

Section 3.1_ICSC05

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Video Lesson: 1:52:37

Welcome to the ICSC Ankle Evaluation and Functional Assessment module. Today, we are going to go through all the ankle assessment skills and also look at some case studies and understand how we not only take those ankle evaluation skills but look at somebody functionally, and then return them to the sport. Get comfortable and dive right in. We are going to take a close look at the ankle and foot today and then move forward with any questions and follow-up towards the end.

When we consider the ankle we always like to begin with the obvious which is just the regular basic anatomy. My history is that I am also an athletic trainer prior to becoming a chiropractor. My master's is in sports medicine. I have worked with athletes at all levels, with the Olympic level, the US Olympic team. I have worked in Europe at several world games and international events. My best advice to somebody who's learning is to go back to the anatomy because the anatomy explains so much as to, not only finding the accurate diagnosis, but also being able to correct problems and get somebody back to sport better than before. I am happy to dive into this with you today. It is one of the areas of the body that I just love treating, rehabbing, and bringing back to the sport, and so much success with it.

Understanding whenever you look at any body part, you might have heard this if you have heard me lecture before. The most important part of your patient encounter is always the history and the mechanism of injury. We have learned this in chiropractic school, but particularly for injuries of the extremities, the mechanism of injury, how it happened, is huge because you are going to take that bit of information of how the injury happened, describe it to me. How did the body part move? Did it roll? Did you hear any sounds with it? That is all going to speak to your laser focus diagnosis. Because we need to be able to get that accurate diagnosis so that we know how to treat properly. Always begin with understanding the mechanism of injury. I am going to say it lots of times as we go through the lecture today. Sorry in advance but it is so important.

The basic anatomy of the ankle is that there are 33 bones, 26 joints, and 3 arches. It is the base of support and ambulation, so it is super important that we truly understand how these 33 joints all come into play. When you get inflammation in one area of the ankle, you must understand that you have inflammation that is infiltrating all this area. Think about somebody with an ankle sprain. We are going to look at some acute ankle sprains later in the lecture. Think of where does all that inflammation sit? It sits between all these 26 bones and between these 33 joints.

Now we have to get the mobility of this ankle moving again post-injury. That is something we are going to talk a little bit about as we go further along. Also, consider that the ankle and foot are your first contact with the ground. It really determines how we transfer force up through the kinetic chain and how when we have a fault with the foot and ankle, this is just going to disturb the whole kinetic chain and we are going to get other injuries. It is just imperative when we have a foot or ankle injury that we really work hard to get them back better than before. I say that over and over again every time I lecture. That is my driving force.

When we are looking at injuries of the ankle, what is the biggest determinant of an injury? The biggest predicting factor of injury is history of previous injury. If someone's had a previous injury, they are more than likely to get another injury in that area. Very rarely people do a great job at taking care of all the fault patterns and all the kinetic chain and correct everything and they return to a sport prematurely. It is very, very common, unfortunately. We need to also ask not only the mechanism of injury. Did you hear anything, but have you injured this before? That is a really critical question when you are evaluating an extremity, is have you injured this before, and if you have, what exactly did you injure before? Then we need to understand with the previous injury, what were the mechanical changes that happened? What has happened here that caused the fault pattern of the foot

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or ankle? Are there inherent strength changes that are going to last for a while? Maybe they are weak and that is why they had this injury.

I always like to say we need to think of the why of an injury, not just that the injury is there. Why did it happen? Was it just that somebody hit them, and they fell? That happens sometimes. Or more importantly, was there a weakness there? Or was there a fault, what I like to call a fault pattern there, or a range of motion loss, that predisposed them to injury? We need to think about all these things as we dive into this area of the body and start having some fun with it.

Let us understand that the function begins with the structure. If the structure is altered, the function is going to be altered and vice versa. The function is altered, the structure is the same but it adapts and changes. It tries to get these what we call compensatory pathways that start to form. If we really think of the foot and those 26 bones and 33 joints, we must understand how many things must happen to walk normally. Just in the foot and ankle, before we even get up to the mid-calf and the knee and the hip and the low back, how many things must transpire before we have a normal gait pattern? We really understand again how important it is for us to really own the foot and the ankle assessment and treatment and be able to pick up on these nuances. How do these changes impact performance? What is going to happen if somebody does not have good plantar flexion? What is going to happen to their ability to jump vertically or their forward propulsion? It really affects the entire kinetic chain when we do not have good foot and ankle motion at all.

Remember, too, we have to think about all the layers in the region of the foot and ankle. It is not just the bones, ligaments, tendons, and muscles. It is everything, like what I like to call a pot of soup. We think about taking to somebody, and I like to look at them in layers. As I evaluate somebody, I first consider the bony structures, then the ligament structures, then the tendon structures, then the muscle. We are layering them as we are doing an evaluation.

When we talk today, we are going to go forward, and as we do our evaluation, we are going to be building an evaluation protocol. I will show you my evaluation a little later. I videotaped it. You can look at it and review it time and again just so that you can get this concept, and then you do not forget about any structures as you evaluate them. You just roll right in and evaluate all the structures.

We think about the foot and ankle. Let us look at just some, and these are at the top of my head. A list of the things that we need to make sure we tick off the box in evaluating when someone has a foot or ankle injury. Do not be so quick to just jump into one injury. Let us say, I think that it is a medial ankle sprain. Do not kid yourself to think that there is going to be a myriad of injuries there. It is very rare that someone just gets one particular thing injured. We have to think about, when you go through a mechanism of injury, other structures are there. There are tendons there, there are ligaments there, there are bones there. We need to think about, do not stop until you are truly satisfied evaluating that ankle, that you have evaluated all the structures.

Here is a list of things that could potentially be injured as we think about foot and ankle injuries. Again, this is not a comprehensive list. These are just some things that I make sure I tick off every time I do an evaluation of an ankle. We always talk about the layers of Tom, Dick, and Harry, or the anterior ankle, and then the side of the ankle, Tom, Harry, and Dick. We think about the tendons of the medial ankle that come off the medial side here. It is tibialis posterior, and that is the Tom, Dick, and Harry. Tibialis posterior, flexor digitorum, and flexor hallucis. That is off the medial side. Then we think about tendons in the anterior ankle here, Tom, Harry, and Dick. We have anterior tibialis, extensor hallucis, and extensor digitorum longus. Knowing that it is not all about the ligaments in a sprain; we need to understand there are tendons there, too. Do not forget about those. It is not too difficult to memorize these. I know we have all done it in chiropractic school. But really own them and know what structure is injured because do not you think we should know if it is anterior tibialis or if it is extensor hallucis? These two things do very different things.

Let us pretend we are using a soccer player and he has an anterior tibialis strain. I might treat that differently than an extensor hallucis strain. For extensor hallucis, I would consider maybe taping or supporting the toe. For anterior tibialis, I am not going to do that. Really understanding where these tendons lie helps guide your

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treatment, and your treatment will be much more effective and the athlete will be much more successful. Because we can figure out what to do to help that athlete get further faster.

I get texts of injuries to me all the time. This was one that I got sent to me that said, "Hey, what is wrong with my ankle?" I do not know how many of you get these, but I love them because I think they are funny. I can actually assess that as they are up on their bathroom sink there. But one thing that we must think about is, again, going back to "How did you injure it?" That is my first question. Were you able to bear weight and walk after you injured it? Could you complete playing if you were playing a game? In other words, could you complete the game? Or did you have to stop playing the game? Those are important questions. Also, looking at this pattern of edema. This is very strange for an ankle injury. As we go through today, you will see by the end, you will understand what I mean. This is not your typical ankle sprain pattern of edema, so this is a little worrisome for me when we see this.

We think about stability of the ankle. We think about these four ligaments right here. Your anterior talofibular ligament which lies right in the sinus tarsi right up here. It goes obviously from your fibula to your talus. Your calcaneofibular ligament is sitting on the lateral ankle right here from the calcaneus to the fibula. The posterior talofibular ligament, again, same as the anterior talofibular, but on the posterior to the lateral malleolus, and the deltoid ligament which provides stability to the medial ankle.

We must really grasp the function of each of those ligaments and understand how to assess them and how they might be injured. If we are thinking about an inversion ankle sprain here, and that is where you roll your ankle, we understand that we are going to injure these lateral structures. That would be your anterior talofibular ligament here, your calcaneofibular ligament, and your posterior talofibular ligament. Those would be the ligaments that you'd be worried about in an inversion ankle sprain.

If you are talking about an eversion ankle sprain here, you are going to be looking at the deltoid ligament. That is your medial ankle. It is actually in three sections. A very thick ligament there on the inside. Good support. We most times see this lateral ankle sprain. That is much more familiar to us, but they do happen to these deltoids. A lot of times in younger athletes, avulsions happen in the deltoid so you need to watch out for that. Here is our normal. Really understanding how it happened starts formulating your diagnosis, your differentials of what potential structures could be injured. Again, we are going to ask, did you have a previous injury to this area, and were you able to keep playing?

We are going to go through ligament testing, and we are going to hit each of these. I just wanted to put up the acronyms so that you understood anterior talofibular, calcaneofibular, posterior talofibular, tib-fib, that is your distal syndesmotom between the tibia and the fibula, your classic high ankle sprain, and your deltoid. That is how I am going to refer to them as we move on.

Let us look at how we might test the anterior talofibular ligament if we were concerned about sprain to that injury. That is the one that is sitting right up here. Someone's going to have swelling right in the sinus tarsi region, so they are going to get inflammation and tenderness right in this area here. We are going to test that with just 20 degrees of plantar flexion and inversion. This test right here is called the drawer test. I do two different tests for my ATF sprain. You can do the drawer. A lot of times you are not going to get this forward motion, so this is not unlike the drawer test of the knee. But we are really taking that calcaneus and we are pulling it forward to try to see if we get a joint gapping here in this talar region. We are stabilizing with this hand here. You are stabilizing that tib-fib and trying to lift this superiorly, so to speak. You are trying to look for gapping here in this area. If we really have a big ATF or an avulsion or rupture, you are going to really get a good amount of movement.

I like to also test the anterior talofibular ligament by doing a Talar Tilt, and we will go through that in a minute. Here's that Talar Tilt. A classic Talar Tilt is where your ankle is more towards the 90-degree mark, here, like this picture on the left. We are actually testing the calcaneofibular ligament. This is a test question, a test answer. In

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the Talar Tilt test, you are testing the calcaneofibular ligament. So, when you do a Talar Tilt, you are truly testing the calcaneofibular ligament.

Real-life test? In real life, we do this at 90 for your calcaneofibular ligament. Then, I like to do a little bit of plantar flexion, so I also can get another look at my anterior talofibular ligament. It is just another little way to see how much motion you get on that ATF, because remember, you are going to try to grade these sprains. Remember an injury of a ligament is a sprain, an injury of the muscle is a strain. These are sprains. Is it a grade 1? A grade 2? Or a grade 3? You are going to grade that by the amount of joint gapping you see or motion on these tests.

I just want to stop here to say it is very important that you always test the good side first. If her injury here's on her left leg, I am going to test the right leg. In this way, it gives you a benchmark to the amount of mobility that is normal for that person. We have got to know if their ankle is loose to begin with or is it tight to begin with? I like to do the other side first. The other reason to is if this is an acute injury, it is very important that they know you are not going to grab their injured leg and rip it off. What we do is we get the good side, do their range of motion, do their special tests, then you have a benchmark to compare to. Then, the athlete also knows and knows what to expect, and they are less guarded. When they are less guarded, you can get more accurate reading on your test, particularly, ortho tests.

This is the valgus stress test. Here is a bird's eye view. We are testing the deltoid ligament, which is the medial ankle, so like valgus stress. We have to understand that the deltoid ligament is not injured as frequently as the lateral ankle. Like the anterior talofib, most commonly injured ligament of the ankle. We have to understand that it is a much thicker ligament, too, so it is harder to injure that area but also a better overall recovery for the long-term stability of the ankle.

This is the squeeze test. The squeeze test is for that syndemostic injury or that distal tib-fib sprain, or high ankle sprain, all the same. The high ankle sprain tends to last a lot longer than your regular ATF sprain. Because that ligament is so much thicker than your ATF ligament, it has more swelling that comes along with it, more disability that comes along with it, more pain. One thing that I like to do for this distal tib-fib high ankle sprain has put them in a boot for a week. They just get better so much faster. They are in a lot of pain in the beginning. I noticed in a week; I make a month's worth of progress when I just put them in a boot. At the end of the week, I get them out of the boot and then I start my rehab.

This is called the Anvil test. The Anvil test is for gross fracture. Pretty much, I just hold them at 90 degrees and you just take your fist and hit the bottom. It is like a percussion test here. If they have a fracture, that is going to also be positive for pain.

We are going back to our foot up in the bathroom, and we think about what your protocol is. We want to make sure for an acute injury that we understand the history and the mechanism, we look at the range of motion, we look at the strength. We must rule out a fracture before you do a whole bunch of orthopedic tests. That would be your palpatory findings. You are going to palpate that distal fibula, distal tibia, your tarsals, your metatarsals, just making sure we do not have any gross fracture before we start cranking on the foot and putting it in different directions.

We are going to look at those patterns of edema. If we see that ecchymosis very quickly, and that is the same day, then I am worried that there might be a fracture. That is like the fracture warning sign, so watch out for that black and blue or that ecchymosis to happen very quickly. Also, take note of where the edema is happening early on because that is going to speak to the structures that are inflamed. Later on, we have what we call dependent edema. Everything goes along with gravity. All bets are off once that has set in because the edema is just everywhere at that point.

Then we are going to evaluate the ligament stability of the ankle and then we are also going to talk about their ability to ambulate. Can they walk normally? Can they put weight on it? Can they continue to play? All these are very important aspects of overall injury in our diagnosis as well.

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Here are our grades of ankle sprains. This picture, I think, makes it easy to get the concept. We have normal; grade 1, just stretching and some small tears in the substance of the ligament itself. Grade 2 is up to 50% of the fiber itself is torn, and grade 3 is a complete rupture. Understand, with a Grade 3, when you do your ortho test, we are going to have serious joint gapping and a lot of motion in that area. As you are evaluating, pay attention to how much motion you get that maybe you do not get on the other side, and barring previous injury, that is going to be how you grade your ankle sprain.

A little key for the foot and ankle is the amount of swelling, and that is actually true for all the injuries. The more swelling, the more edema, usually the more severe. A grade 1, little to no swelling and that is an easy one, too. Then, we also know when we grade them, we also can predict the return to sport duration. How long will they be out of play? That is really important.

We talked about structures affected by function. Since we are also talking about functional assessment of the ankle today as well as structural assessment of the ankle, we need to consider that the most important part of an ankle injury and a foot injury is that we really think about how that motion needs to happen, how many things need to happen normally for that athlete to go back to where they were pre-injury? I want you to get that in your brain as you visualize all the different views, medial-lateral, superior-inferior of the ankle, on the talus and the calcaneus, and this whole articulation. It is very important to understand we have got to get full function back before we get somebody back into the sport.

When we understand the functional component of it, we really can get the anatomy. What is the anatomy doing in a good way or doing in a bad way? What does it need to do? What is the chain of command? What has happened here? What is fallen away from normal and why? What are the compensatory mechanisms? What are they doing to limp or to walk normally? What other muscles are working that aren't supposed to be working? We want to not rule out footwear, particularly when they are injured, advising them on what they should and shouldn't be doing, and the anatomical variance. If somebody has extra bones of some type in the foot, we have accessory navicular, or what have you, we need to understand that, too. A lot of those sometimes are diagnosed as fractures, which is funny, and their goals, that is an important thing to think about. We need to align your goals with the athlete's goals. That is an important thing to happen early on. We have to think about if their ankle looks like this. This is somebody coming to me the second day after an ankle sprain. If their ankle looks like this, what is the likelihood that they are going to be able to give 100% full out that day in competition? With learning this stuff and becoming comfortable and working with more and more athletes, you will be able to understand you have got to align your goals early and set realistic goals. Your goals need to be with the safety of the athlete in mind. We do not want to put them out where they can get another more severe injury. Consider all these things as we start thinking because an athlete is like, "I want to play today. I got to play today." We need to really think about that return to sport strategy and aligning what you think is realistic and what your athlete thinks is realistic together.

Of course, we cannot forget about all the motions of the foot. Pronation, supination. Inversion, eversion, plantar and dorsiflexion. We need to understand that all these movements come with, not only structural considerations but also functional considerations. Muscles, tendons, joints, and ligaments. As we are putting somebody through an assessment, we need to really understand these layers and how they interact with each other. How is an injury of the anterior talofibular ligament going to affect the talus? How is an injury of the peroneal tendon going to affect the cuboid? These things are very important facts that we need to understand.

Here we are looking at the medial side and I want you to really appreciate this deltoid ligament. Usually, we cannot see it too good in this picture, but it is more broken up into three sections, but thick, strong. Then now, we jump over and compare it to this lateral ankle view here. Look at that anterior talofibular ligament, thin. Here is your distal tib-fib or that high ankle sprain. Can you really understand now why these takes longer to get better than this one? There is just more substance there. A lot more significant injury, more edema, more swelling. Plus, when they stand up, and this is sprained, the tib and the fib separate, so it is like a wedge with the talus, slides up between, and it creates constant pain. That is why it is good to get it in a boot where we keep that tib-fib nice and stable, squeezed together, so that does not keep separating and it takes longer for that ligament to get better.

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We said distal tib-fib, anterior talofib. Here is a calcaneal fib right down here, and then posterior talofib is here. Get that anatomy and appreciating how the ligaments are not all created equal, is important. This anterior talofib is very different than the deltoid. Therefore, different swelling, different functional differences, and different return to sport durations. We are going to consider our movement, and when we get an ankle injury, how do we think about getting somebody back to sport, post-ankle sprain? What do we need to think about as far as overall motion when we are evaluating somebody? Particularly for injuries of the ankle and foot, we really need to appreciate these phases of gait. I know you went through this in your biomechanics section. I am just going to glaze through it quickly as a quick review for you because it is just so important. Understanding this stance phase of gait.

Let us look at our really high-tech picture here. When your foot touches the ground, until it comes off the ground in the back, that is considered your stance phase. That is 60% of the gait cycle and the thing that is important to understand with that stance phase is that that is when all your major muscle groups are really working hard. That is when most of the big muscle groups are working the hardest during that stance phase. We are getting our forward motion or energy from that stance phase.

The swing phase is a smaller component. When your foot swings through in gait. There is no weight on it. We have more of the foot intrinsic muscles, anterior tibialis, just getting that foot; not as much as the big muscle. We look at that 60% of your gait cycle. That stance phase has an important part to consider when we are looking at injuries. Thinking about that, too. I have a gait analysis thing on my Instagram. We will be doing that regularly so that you can truly understand this gait and how to take a foot injury, maybe it is a little bit older or not getting better and figure out where it is coming from. Again, it is not always the obvious answer. We understand that this stance phase is divided into four different phases. I said from the time your foot hits the ground till the time it comes off the ground, that is your stance phase. That is the easiest way to remember it. Here is a little better view. We just looked at the stance phase. From contact to propulsion. Here, we think about how much energy needs to happen in that amount of time. I want you to just think about that for a minute. Then let us just push that to the side because we are going to come back to this concept later. This midstance is most of your energy. But you need to gather a lot of energy from this propulsion stage.

If we think about all these things that need to happen in this midstance, you have to think about, boy, that is a lot of stuff that needs to happen. Now when you have somebody with an injury that is cheating the system or limping or not walking properly, or maybe they have developed a limp and not able to get rid of it, you have got to go back and break that chain. You have to understand these phases of gait so that you can figure out what is missing. Is it that the ankle is not going into pronation, so I am not getting any oblique access plantar aponeurosis motion? Or is there a problem with the midtarsal joint? Maybe that is the problem, post-injury.

If you think about an ankle sprain, and let us pretend somebody was booted or they were braced, they lose motion in all those joints of the foot. It is not just the injured area that loses motion. Then you have to work to get all that back, and who better than us to go ahead and adjust all the bones and mobilize all the bones and joints in that area of the foot, and they will come back quicker? I think a very nice addition to rehab is to get a little bit of chiropractic in there as they start getting better.

When we think about gait just a little bit more, it really is just control of a fall. You are controlling the fall of your foot down. When we talk about running, more has to happen in a shorter amount of time, you are really controlling that fall. If your walk is not without a limp or without falls, all hell breaks loose once you run because now we have lost control. What we really need to make sure is we are bringing somebody back post ankle, that we'd get them to walk without a limp. That is your first stage.

Let us look at what happens with this gait here. With your foot dorsiflexion, the tibia internally rotates, the talus everts, and the foot pronates. That is an important component. I want you to think about that for a minute. As you start to dorsiflex, your tibia must roll in so that you can begin the pronation portion. Pronation is not always bad. We need to be able to pronate so that you have normal motion. It is just hyper pronation is the bad part.

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Then let us look at plantar flexion, and that is more of your propulsion phase when you are pushing off on your gait. We have plantar flexion, your tibia is going to externally rotate, your talus is going to invert, and you are going to supinate. When you push off, you supinate. When you step down, you pronate. Makes sense, but we have to understand as we are bringing somebody back, we need to gather these motions also. This talus and this tibia are often forgotten about. We cannot forget that we need motion from them too, so watch those gait faults as you are bringing somebody back post-injury.

This is an interesting case, which we will get to later in this lesson, but we have to think about what happens when we start to have a cadence or your cadence improves or increases. You go from walking to a slow jog to a run. What are the things that happen? Now you have a very short stance phase. When your foot is down, it is for a shorter amount of time. You need those same muscles to gather more energy, to go through a greater range of motion in a shorter amount of time. They need to become more efficient with a greater range of motion, up to 50% more range of motion from walking. If you do not have a normal range of motion, post-injury, for foot and ankle, you are not going to be able to run normally. Very important are those early stages, and we are going to talk about it as we go forward. Getting that range of motion is important for any athlete that is not sitting down, which is most athletes. We have got to get that range of motion because we know we need a little more than normal for you to be able to run. You need 50% more than you need, just walking. You will have vertical forces that are changed too when you run. We need to understand the shock to the area and how's that going to affect your injury. Then, there is going to be a change in that basic activity of the muscles of the lower extremity, when they work and when they do not work, that short bursts of activity.

We are going to go back to that case and I am going to show you him a little bit later. I do not want to spoil it now. Let us look at when you are evaluating an ankle. Do not get too myopic and get stuck in the ligaments. We must do that too. That is an important part, but it is not the only part. We need to look at their gait. We need to look at their shoes. We need to look at their posture, the practice surface, how frequently they are practicing, hip and knee function. We are going to go back. You have got to get your laser diagnosis and then you must be able to pan back and look at everything as we are returning them to sport.

We cannot forget about that. Just do not patch up the problem and send them back. We have got to be able to scope out and look at everything and send them back in a safe way. We need to pull it all together in the end as we start bringing somebody back from injury. How are we going to do that? How are we going to take somebody that is on crutches and get them back to run a marathon? This is a marathoner here that we are going to look at. What are we going to do about that? How are we going to put it all together? I am just going to play this video here, and then we are going to talk about his case a little bit later. I want you to just watch his gait pattern and see if you can pick up what is there. I am going to play the sounds, so you can hear his steps.

[video playing]

I am not going to tell you the answer now. Let us see how good you are. Hopefully, by the end of this lecture, you guys are all great, and see if you were able to pick up the problem that this marathoner came in for. We are going to come back to that later. A little bit of a challenge for you as we are moving through the lesson.

This was another one that I got. A text to me, which I got, which I want to highlight. This was a patient of mine that was mowing his lawn and the lawn mower went over the hill. He tried to pull it back towards him and it ran over his foot and chopped off his toe, so we needed to have it amputated. Very interesting. He developed that phantom pain and needed to have a TENS unit implanted into his spine to stop the pain that he was feeling from the toe that wasn't there anymore. But what we think about is the importance and significance of the great toe. My brain always goes to, oh boy, how are we going to make up for his gait pattern without a portion of his toe? How do I have to cheat the system to get that very important motion back? The big toe is so critical with our normal gait.

Here is him walking post-amputation here. He is really supinating, only walking on his back outside. He will not use the front toe. This was a couple months after his amputation, too much pain. We think about there is no way that that person is going to have normal motion. What happens to the kinetic chain? I am going to shut the sound

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off so you can see and focus. What happens to the kinetic chain when he loses all this motion? Let us talk about the knee and the hip and the back. What is going to fail next? You certainly can see that his affect or his whole psyche is different. As we move forward we will continue to talk about that. That is something we cannot forget about with athletes, is how they are emotionally responding to injury. This picture on the right is of my grandparents. I try to include them when I can. They were married for seventy-five years. They landed on a slide deck by accident one day. I figured that was a sign and I had to keep them. That is grandma and pop there.

Here is his toe, post-amputation. If we look at the research on how important that big toe is, it really plays a large role in your performance, not only on your stance leg, for sure, and you lose the ability to control directional changes with your body. Forward and back, switching weight, turning, and pivoting. Your balance is significantly different when you are not using that big toe. We are just using this as an extreme example.

What about when somebody just has a toe injury or toe stiffness or loss of range of motion of the toe? The same thing happens. We lose balance. We lose the ability to transfer weight and change directions efficiently, so do not negate looking at the great toe. I have had several athletes that were just having trouble doing skills, and it came down to the big toe had just lost a lot of motion and had inflammation. They did not think it was anything significant. Once we improve that, lo and behold, everything comes back. That small little area of your body really has a large impact on the movement, all the way up the kinetic chain.

When we think about evaluating an ankle, we also need to think about the functionality. That is why for this module, we put the two together because I have a very hard time just doing an eval and not looking at the functionality of it, too.

Let us move forward and let us look at the talus. The talus is this bone right here. Here's your tibia, here's your fibula. This was a patient of mine that had a trimalleolar fracture, so a fracture here and here. Here's the talus in here. It is a very important bone. If we think about that talus and that talocrural joint. This is your tibia and fibula. Come down, and here is your talus sitting in there. The importance of that ankle rocker mechanism. As you are walking, that ability to rock on that is super important. The motion through this joint and this fluidity is very important post ankle sprain.

We have to also think that the talus has no muscular attachments to it at all. What are the series of effects on a faulty talar pattern? This is something that is so overlooked with ankle injuries. We really need to get in there. Once the acute phase is over, make sure that the talus is motioning normally. Super important. You are going to see your ankle sprains, as they are getting better, improve a little bit quicker once you get that talar motion.

Let us look a little closer at the talus and how it sits in that calcaneus. Here is your calcaneus and here is your talus. It is a very odd-shaped bone. This sits right here and it contributes to that rocking motion. We need to understand as we are adjusting that, we want to think about traction, but also its ability to roll on your calcaneus. It is important. If we look at the top, the facet here and on the sides, it is such an important aspect. Then, look at the facet here that articulates with the navicular. Can you understand when this is not articulating, it is not moving? Your whole ankle is locked up. Again, as somebody gets better, the long axis tractions, a little bit of rolling, and a talar glide adjustment are super effective with speeding up recovery once the ligament structure is somewhat healing.

Talking about the talus too, we will explore and understand what happens when somebody injures their anterior talofibular ligament. We said that was the most commonly injured ligament in the ankle. A most 87 to 90 something percent injured of this ATF. If somebody injures this ligament here, that is an inversion ankle sprain, and the ankle is rolling this way. Can you understand how that happens? The talus can hit up against the tibia and cause what we call a talar dome lesion or an osteochondritis of the talar dome.

There are many different types of these osteochondral defects, but what happens in a severe ankle sprain is that the talus will butt up against the tibia and cause a compression fracture or microfracture of the area here. This is how it looks on MRI. On plain X-Ray, you might miss this. Not all these are visible and even a type 1 is not even visible. My point in showing this to you is, as you are evaluating your ankles, if it is a more severe ankle sprain or

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someone has a lot of motion of their ankle, they have injured it lots of times before, they may have a talar dome lesion, so make sure you put that foot in a little bit of plantar flexion and you make sure you palpate the talar dome for pain up in this area. It is an important part of the ankle assessment.

The most common site of an osteochondral defect is the talus, so it is super important not to forget about looking at this. It is on the medial aspect, so understand that is usually because of a lateral ankle sprain and that is why we see it their most commonly.

Here is another view of that talar dome lesion. They can progress not only from like a microfracture to forming like an osteonecrotic area where this breaks off the bone. You can get it where it completely breaks off and floats around the joint or it can just sit there and be stable. This is a stable defect here. This would be something that becomes more unstable that would need a surgical repair. It is important for you to really make sure we are not forgetting to assess that.

If you can see the location of this one, this is probably not from an ankle sprain. It is not on that medial side. It is right in the middle. That is more from repetitive stress. You can tell what it is from by the location.

This is an osteochondral defect. We talked about several types. This is a talar dome lesion. We have to understand the sport where the person is at. This is a stable one. I see no fragments floating around. Sometimes these correct themselves over a period of time. We keep an eye on them. We just decrease impact if they are having pain there for a little bit, and then try to figure out the why. Is it that we have a vascular area of the talus? It is a poorly perfused area with blood. Or is it that there is so much repetitive trauma? Or do I have another issue, a metabolic issue? We should consider all these things when we start looking at injuries and then going forward like that.

We are going to take a minute and look at these Ottawa Ankle Rules. The Ottawa Ankle Rules tell us when we need to get an x-ray for an ankle injury. It is very important to consider you will need to get an x-ray when these things happen. When there is any bone tenderness, you want to think about the lateral malleolus here. The base of the fifth metatarsal here when you have any bony tenderness, or they cannot bear weight. Those are the times that are your red flags, called your Ottawa Ankle Rules, and that you need to make sure that you order an X-ray or send out for an x-ray.

Let us go backwards. Here, the Ottawa Ankle Rules also pertain for the medial side of the ankles. The same thing. Medial tibia or fibula for the lateral side, and the navicular here. Okay. We need to understand bony tenderness, distal fib or distal tib or base of the fifth metatarsal or navicular or they cannot bear weight. These are the times we send out for an X-ray. Good.

This is called Thompson Test. Thompson Test is to rule out Achilles tendon rupture. Notice here that when I squeeze her calf, I get a mild plantar flexion. When I let go of her calf, it goes back into dorsiflexion. That is a negative test. That tells me that the Achilles is intact. When somebody has ruptured and you squeeze the calf, it will not move; it will stay just like that. That would be a positive Thompson test. Understand, this here is a negative Thompson test. When I squeeze the calf, the foot will mildly plantar flex. That rules out an Achilles tendon rupture.

Let us then start getting your brain going a little bit as we move further through this lecture. We want to think about what is going on with this athlete. I want you to start putting your brain into case studies as we dive a little bit deeper and get you working on what do you think? I want you to look at this picture on the left and I want you to think about and jot down a couple of thoughts. This is an athlete, a gymnast, post Achilles tendon rupture on the right side. Never really rehabbed properly, sent back into sport, and re-ruptured again. How could you send this person back into athletic activity? That is my point. We can do better than that. We can rehab somebody completely and correct all these million faults I see all the way up to her hip that are going to just predispose her to injury again.

If we take her lateral view, we can see the genu recurvatum here. She's just waiting to happen, and other injuries waiting to happen. Consider the whole chain that we have got to correct in order for her to be able to get back, not just looking at the Achilles and stopping there. That is not going to do us much good. We need to be able to

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move forward and really understand that we have got to look at the whole kinetic chain. You need to correct everything or they are walking into a lion's den, and they are just going to get injured again. That is what happened with this athlete.

Here is a closer look. Here is the scar here, post this Achilles tendon repair. She needed to have it surgically repaired. Lots of research on Achilles tendon and thinking about, do I surgically repair it or not? It is a mixed bag. It depends on where it is ruptured, number one, the age, and the activity level of the person. I am going to leave it to you to do some reading on your own on these Achilles tendons.

She had a musculotendinous junction tear here, surgically repaired, re-ruptured because they were doing a lot of deep scar tissue release. For this particular musculotendinous junction injury, you need that scar tissue to heal. It re-ruptured because they broke down the scar tissue. They did Blood Flow Restriction PT on her, but the problem with the rehab of Blood Flow Restriction, particularly for an Achilles tendon and your gastric. We have this interesting nuance with these gastroc injuries, these Achilles tendon ruptures. The gastroc muscle wastes very quickly. Within 7 days we see a big change. But then it gets something called metabolic resistance. The number of mitochondria down-regulates, and we lose the ability to gain muscle, to become anabolic again. If you do blood flow resistance training, our mitochondria needs that blood flow to grow and proliferate. You are precluding the problem from getting better. The treatment regime was just incorrect for this problem to allow the anabolic nature of that gastroc to come back with the blood flow restriction.

If we are going to do this a little bit better, we are going to get a better strategy. We are going to give homework to the athlete at home to speed up recovery. We are going to look at the gait. We are going to look at the whole kinetic chain. We are going to correct everything, her genu recurvatum, her core strength, her shoulder rounded forward. We need to fix everything and push reset on her and then see how that progresses. That is your plan.

When we think about an ankle that you will see acutely, we need to know what is your plan? Are you going to wrap or tape them? Are you going to brace them? Is there an imaging issue? Do we need to refer them out? When you get your assessment skills together, you need to have a plan there. Let us talk about that for a minute. What I did for you was I videotaped an ankle assessment. This is my order of events here. I thought it would be better for you to see what a full ankle assessment might look like, and then you can practice over and over again. It is very important for you to practice your assessment in an order that allows you to not forget structures. I have been doing this a very long time and I still do the same order all the time, and that way, I make sure I hit everything. Sometimes you are surprised. Sometimes you have something there that you did not think was going to be there, so it is really important to consider all of that.

We are going to observe the area for ecchymosis and deformity. You are going to look for the patterns of edema, comparing good to bad. You are going to compare active and passive range of motions from the good side to the bad side. You are going to palpate all regions for tenderness. We talked about those Ottawa Ankle Rules. We are going to look at the distal tibia, the distal fibula. We are going to look at the navicular, the base of the fifth metatarsal, all the tarsals, and all the metatarsals. You are going to do a manual muscle test in all planes. You are going to do your anterior Talar Tilt. I said I do that in a little bit of plantar flexion and at 90. Your anterior drawer test and that is for your ATF also. We are going to do a valgus or eversion stress for your deltoid ligament. The Squeeze Test for your high ankle sprain. You can also use your wedge test for your high ankle sprain as well. You are going to check the talus for those talar dome lesions. You are going to do the Anvil test for fracture, Thompson test for gastroc. Always check vascular, neuro assessment as well.

Let us watch an evaluation. I am going to talk you through it a little bit. This starts with our active range of motion here. I do this for every single patient. Once they do an active range of motion, then I will start with a passive range of motion. Here is a manual muscle test in all four planes. Then here is my passive range of motion in all four planes. Palpating distal fibula all the way down, looking around that malleoli, palpating distal tibia all the way down to the medial malleoli. Then, I am palpating the navicular, base of the fifth, the talar dome. There is your palpation there. Then, all of your tarsals. Metatarsals, too. Make sure you are spending some extra time on the base of the fifth metatarsal. It is super important for lots of injuries to that area. We will talk about that. Looking at your peroneal tendons, here's Anvil test. Palpating anterior talofibular ligament there, calcaneofibular ligament

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there, posterior talofibular ligament there. You are looking for tenderness. Palpating the deltoid ligament on the medial ankle. I always check the Achilles tendon for tenderness and edema, peroneal tendons, too. Then I start muscle testing for peroneal tendons, posterior tibialis tendon, and then we do peroneus brevis and tertius, and then extensor hallucis, anterior tibialis, extensor digitorum.

We want to make sure that we are looking at everything. Here is your Talar Tilt at 90 for calcaneal fib, plantar flexion, Talar Tilt for anterior talofib. Here is your drawer test for anterior talofibular. Eversion stress test for deltoid. Again, I always check that posterior calcaneal area for retrocalcaneal bursitis. That is your ankle assessment. Just take that, videotape it, play it over and over again, and practice that. You will be awesome at evaluating an ankle if you just do those things.

We think about our treatment progression. We have an ankle sprain. You have diagnosed your ankle sprain. What is your plan? We need to talk about that too because you need to have that nailed down. Number one, foremost, always is you have got to get rid of the edema first. If we do not get rid of the edema, we really do not start healing. The range of motion will always be in a stuck position. They will always have pain and the tissues really do not start healing until we get all those inflammatory modulators out of the way. Once we get edema reduced, the range of motion will come. We are going to be working on that. Then, we are going to begin our strength and proprioception. Do not forget about proprioception. It is the most critical part of any rehab protocol for someone that is returning to sport. And then we are going to begin our strengthening and our return to sport plan in straight planes, in other words, running forward and backward first. Then we are going to go to lateral motions last. That way, we understand the difference.

This is an interesting athlete with a left peroneal tendon rupture. Really notice how he stopped using his toes. Can you see how his toes just is not active? We do not see them pushing down on the floor and holding it steady like this. They become a bit flaccid. What happens is when you are not activating your toes, you cannot stiffen up your lateral ankle here, your cuboid, and you cannot activate your peroneal tendon, so the body was super smart and figured out how to shut off this peroneal tendon when it ruptured if he just did not use his toes. But the problem becomes that we need to reintegrate normal motion in someone that is had this for a year in order to return him. We have got to reteach his toes to work because they have shut off. They are out to lunch. We have to consider all these things as we come back. It is not just the one problem.

We have your acute ankle sprain. What are you doing that day in your office? What is your plan? Are you going to ice? You are going to do compression. You are going to do elevation. I always find that E-stim on the area, the day of an injury really speeds up my overall recovery, so that is the thing I like to do. There are lots of controversies with ice. I still use ice in the first 24 to 48 hours with somebody. I just find I can get to where I want to go faster. Elevate. Now, I like to wrap. I did not wrap this patient. I typically will take pre-wrap and wrap up between the toes and all the way up to the mid-calf, because you do not want to allow the swelling to drop down into the foot because then you have to get rid of it all. The more swelling you can prevent, the faster the person will get better. That is why you are going to keep it up. This is an Air cast that she has on here. That will prevent medial and lateral roll. This would not be for a high ankle sprain. I said, for a high ankle sprain, I put them in a boot. This is more for an anterior talofibular or calcaneofibular sprain or even a deltoid sprain up to a grade 3. I can put them in this. Grade 3, actually, I might put in a boot, but a healthy grade 2 would be in here.

If they need crutches, they are on crutches for the day. Home instructions are very important. Take time to tell them what you are going to do. You are going to ice it every two hours. You are going to elevate it. You are going to wiggle your toes. Wiggling those toes obviously helps move that swelling down. Keep it elevated. What I like to tell people is take a blanket, roll it up, put it under your whole mattress, and that way, all night, your feet are slightly elevated. Just a little bit. It does not need to be a lot. And then you want to see them the next day. You always want to check these injuries the next day so that you can just double-check yourself, do another reassessment, see if anything's changed or different or if you need to plan a referral.

As your rehab starts to progress, we want to think about, we did the range of motion, we are doing passive and active range of motion first. They are wiggling their toes. They are going to spell the alphabet with their foot. So, that is what I tell them. When they are home, I want your foot up three times a day. I want you to spell the

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alphabet with your foot, so this is an a, this is a b, as your foot is elevated, because what happens is that movement will pump the swelling down out of the ankle. We want to make sure that we have gravity and the movement to go ahead and pump down. Then we are going to bring them to the office and elevate them. And then I do passive range of motion in the office. Just nice and gentle. Nothing painful.

As they progress, then I will start doing some resistance bands. You are not going to start strength too soon. You do not want to start strength the first day or two or three. Maybe by day four, if it is a very mild ankle sprain and they can do it, but you have got to watch that you are not doing it too soon. When you are ready to incorporate your strengthening, you can use TheraBand. Here is an example here. This would be an inversion, e-version, plantar dorsiflexion. So, here is plantar flexion, dorsiflexion here. This here would be inversion, and this would be eversion. I like to stabilize the leg with my other hand. If they just do small motions, you could start with a very light resistance band and then gradually increase that. You also can start with just a couple of repetitions. Maybe the first day you are just going to do five repetitions on a very light band, and then you will increase that till they do maybe 12 to 15 three times in each plane. Then you can even teach them as you progress to do that at home if they are able to.

The other thing I also like to do is toe raises. I tell them to do this when they are brushing their teeth. We do it also in the office. We do three sets of 15, toe straightforward. Here. Then toes turned out, and then, toes turned in. Making sure they are doing those toe raises to help keep that foot control, that gastroc strength. We want to do them with a straight leg and a bent leg so that we get the gastroc and the soleus complex. It is super important to include and not forget about the soleus. That is really our powerhouse muscle. It is very underrated in the past but we are really finding out with the newer research that it is really all about the soleus.

Then, as we progress, this is the BAPS Board. It is a nice thing you can use early on, seated, when they cannot put all their weight on. Again, we are going to work from non-weight-bearing to weight-bearing activities. This will help with range of motion as well as starting our proprioception.

Sensory motor stimulation or proprioception is a very important part of rehab. We cannot forget it. With injury, our brain forgets to adapt for where your body is in space. The kinesthetic awareness, when we do not rehab that part, you send them back without the ability to make corrections. Then they are running on a field and maybe the field was a little off or they step in a hole, they are not going to be able to make that correction to prevent injury. It is a very important component of your rehab.

We will do the BAPS Board here. They sit and they try to tap each edge of the board down without moving their knee so that their foot is rolling the board. They do it seated in the beginning. And then, when they can weight bear, they stand on two feet, and then when they get good, they hold on to something, they do it on one foot. That is the progression of the BAPS board.

You can also use a wobble board, which is very nice. It does not go all around the circle, but you have forward-back motion and side-to-side motion. This might be a good progression before you do the BAPS Board if somebody's too unstable for the BAPS Board. It is very important that they start learning how to control in multiple planes. It also speaks to foot intrinsic muscle strength. Super important for recovery.

We need to think about our return to sports plan. What is the measure of readiness? When do I know somebody can go back and start participating in sport? How do I progress them back? What is my first step? What is my second step? That is what we are going to talk about next. We are going to talk about how you work somebody back into sport. I will tell you I really want them back better than before. We saw the gymnast that was sent back worse than before, so she was set up to fail. Let us not emulate that. Let us make sure that we can take them to the next level.

The first thing we need to think about is for you to start rehabbing them in more sports-specific drills, which is something we need to do as we are progressing them. We need to think about, what does their sport need them to do, and what type of strength and rehab can I incorporate to promote those motions or those muscles? In the

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beginning, you might need to tape or brace them for rehab, or as they return to sport, and maybe just do drills non-contact or just do some light exercise, you might want to tape or brace them. What I did was I just videotaped a taping procedure. This is a regular rigid tape, so this would be a post-injury, more of a rigid stabilization type taping. It is called an ankle Gibney tape. Basically, it just prevents you from rolling in or rolling out depending on how you pull the tape. Let us watch this. If you want to record this, watch it over and over again. Please, please, please practice taping. When we see you for Hands-On modules, we will be practicing this, so I am going to know who practiced and who did not. Let us just watch this here. I will turn the sound off.

These are Heel and Lace pads. The Heel and Lace pads prevent friction in the tendons in the front and back of the ankle so that you do not get a blister. This is called pre-wrap here, and the pre-wrap also, same things. It protects the skin. When we are really taping somebody, I like for them to shave the leg so that you can tape on the skin, and that way you have less sliding of the tape. It is actually a little more stable. You are going to begin your tape right where their gastroc comes in to meet the leg, so higher up. I would have liked this tape a little higher. It is a little low for my taste. But two ankle stabilization foundation straps, and then another one down distally. These are your proximal and distal markers. Making sure that the furthest down you are going to come is just behind the base of the malleoli because you do not want to compress that.

This is called a horseshoe. It goes from medial to lateral for lateral ankle sprain. You are going to pull up on the lateral side so that you push them into eversion and lock that ankle in. This is a C-strap here and this is called an open basket weave. We are going to alternate between this horseshoe and the C-strap. You are going to overlap the tape by half, moving forward on your horseshoes, and by half moving up on your C-straps. That way, slowly you are moving up and forward in your tapes. You are going to see how I keep slowly inching forward and up. Again, a series of three of each alternating or basket weaving them together and really pulling the tape up on the lateral side so that I lock them into eversion. That is really important.

I would like this tape to come a little higher on the calf. Here's another C-strap, and then you see that little area in the front of his leg that is open with pre-wrap. We call this closing the window. Then we do our C-straps around and we slowly work our way all the way up the leg here to your foundational straps, where we close that window. Again, we always want to alternate or overlap the tape by half and making sure you do not have a bunch of wrinkles. If they have wrinkles, they are going to get blisters, and they are not going to want you to tape them again. That is why you have got to really practice. Again, overlapping by half, so you will work all the way up. Then we are going to begin our figure 8s and heel locks where you are going to go behind that heel under the foot and up and behind the heel under the foot and really pull out early to lock them into eversion. That is the important part of this tape, is that you lock them in eversion. Do not lock them in inversion. They will sprain again.

Then we are going to do the heel lock in the opposite direction. Again, pulling into eversion and then doing a figure 8 wrapping around the ankle. I hope you have all that. So, lots of practice. These are open C-straps very gently laid over the foot on the top and bottom not connected so that the foot can spread out when it steps. That is why it is so important you start that tape behind the base of the fifth metatarsal so that the foot can spread out when they stand. Lots of research on that last strip that comes forward has shown that when you put that piece of tape on the dorsum of the foot here and you put that last little strip here, that little half strip you saw me put, it is a stimulation to the brain to get it to dorsiflex. We have noticed in research that if we have that little piece of tape, they tend to not plantar flex as much. When they are in dorsiflexion, it is a more protective position for the ankle. Dorsiflexion, eversion. They are not going to sprain again. We want that little half strip again not too tight. Do not compress.

When we think about tape, there are lots of different ways to tape. It is only limited by your creativity. But you must understand, it must make sense and it has to be doing what you want it to do. I will tape lots of different ways depending on the athlete, what is practical for that athlete in that sport, and what I want the tape to do. But it cannot just be some wonky tape that you made up that does not do what it is supposed to do. So, make sure that you are proficient in what you are doing, and it makes sense, and not just laying tape on there because you need to lay tape on there. You must understand what type of footwear the athlete is wearing or are they

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barefoot? If this is a gymnast that is on a balance beam, is this going to work? Or is she going to be able to turn in her toes? Or she is going to slide off the beam? You need to understand, is it functional for that athlete? Is it safe for that athlete, and is it doing what I needed to do? This is a dynamic tape procedure. It is wonderful for lots of athletes for propulsion. It helps create that windlass mechanism. We will be doing a lot of the dynamic tape in the hands-on module, having lots of fun with it. I love that product too. Do not worry, we will get to all that.

Moving on with our progression of rehab here, we want to think about, now we are talking about return to sport. We have somebody getting better. What are some of the things that I can do not only in rehab and in therapy but as they start returning. Really important. This ankle hopping progression is super important. It prevents a ton of ankle sprains. This is even something that they can always do in their warm-up after their injury, and you will see several ankle sprains not happening because of this. Really, we start them forward and back hopping. Real simple. Making sure that they feel safe, and their ankle feels stable. And then as they progress, they are going to move side to side. Again, a little more challenging because we have lateral motion here. We are going to do just 30 seconds of each motion in the beginning. And then as we work through the progression, we are going to go ahead and we are going to go to single leg hops, forward-back. The goal is to get her to work up to a minute, hopping on the injured side for strength. We can look at this one here. This will just be single leg forward and back and single leg side to side.

Again, this would be our next progression. The more advanced would be this one here where they are doing a triangle, obviously. And then, side to side. They are going to be nervous doing this side-to-side pattern, particularly if they have a lateral ankle sprain stepping back to that side. We can really measure readiness by not only their confidence in doing this and their ability to do this but their ability to do well, also. Not limping, not jumping, not stopping early. These are great activities and some ideas.

Then we want to think about, how do I keep progressing them past that. When they can walk without a limp, they can start progressing. We have got to get them to walk without a limp, and then when they can run without a limp, we can begin short distance running stuff. We want to begin those sport specific exercises as soon as possible so we can increase function.

I want to just take a minute to talk about that. We need to be able to cross-train them too. Because they have an ankle sprain does not mean they cannot do handstands or press handstands or cast handstands on the bar, or for another athlete, something with upper body or swim, cross-training. We do not want them to lose their global strength. We need to be a little creative in protecting the injury but keeping them active in a safe way. Beginning with those straightforward motions, forward and back. The proprioception is super-important. It strengthens the region globally. Everything. And then we want to slowly add time and intensity on. If we just start with 10 minutes of activity, then we are going to do 20, then we are going to do 30, and we are slowly going to add to it. They are almost doing a practice. You are going to have them continue that strengthening plan.

We are going to talk about medial tibial stress syndrome. A lot of you are familiar with this more so than you think because these are our stress fractures. These are those stress fractures that we might see more commonly in women than men, more commonly with women that have a lower BMI, metabolically challenged. They are not eating enough food to sustain their metabolic rate and therefore adequately turnover bone. Somebody that maybe has Vitamin D deficiency, so metabolic issues as well. It is due to repetitive trauma of the area. We also know that it is predictable for somebody that has a narrow tibial width and hip external rotation. That is an interesting thing to think about. Somebody that continues to get shin splints, we need to see, are their tibias narrow. Do they have that hip external rotation? Or let us look at the shoes. Are they running on poor shoes, so are they pronating too much? Are they in a barefoot shoe, and maybe they cannot be in a barefoot shoe? They do not have the intrinsic muscle strength for that of the foot? Looking at all these things for tibial stress syndrome, and then, of course, the tibia, hence, the name medial tibial stress syndrome, is the most common site for stress fractures in the lower extremity of all. And then followed by the fibula. We are going to go ahead and we are going to go through that. Just a little more detail.

Let us look at shin splints. We are going to see that we have a very common sight in this medial tibial border. Here. We also are going to look at the distal fibula and then be wary of the pain in this anterior tibialis region

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because sometimes that can turn into chronic exertional compartment syndrome. That is something completely different and something that is more prodromal or lasts for a long time. The most common site for tibial stress fractures is 12 to 15 cm above the medial malleoli, so in this area here. What you will do is you are going to palpate down the tibias. I like to go to both sides at once. You can feel the periosteum lift in the area of pain, and they will have exquisite tenderness in that spot. That is your idea that either you have a pre-stress injury or a stress fracture. You might have to order imaging or decrease load and get them off their feet and cross-train for a little bit. The mid-shaft stress fractures and medial tibial syndrome are the ones that have a high incidence of nonunion or they do not heal well, so we need to be a little more conservative with having them return to sport until that is really fully healed.

Here are the stages of medial tibial stress syndrome. We have a grade 0. This is normal. Your grade 1, you are going to have mild edema. That is periosteal edema here, so your periosteum lifts, which is actually quite painful. Lots of neurovascular input in the periosteum, so this is a very painful structure. Here in grade 2, we have marrow edema. We can see this on a T2-weighted MRI. But then we also start having these bony changes that we see, and that is how we can grade the difference. We really see that difference on MRI and we really understand how we can better differentiate the two. And then we are going to look at grade 3 with more bony reactions. Grade 4 is where we start to see bony changes in multiple areas of the bone, and then, grade 4, we just have a linear fracture line.

This is the high incidence of non-union in that mid-tibial shaft, medial tibial stress syndrome. We need to be careful of these because these turn into those long-term injuries. We also need to be careful of these for chronic exertional compartment syndrome because that is a huge part of it. It actually starts with medial tibial stress syndrome and turns into a long-standing compartment syndrome. Good.

Understanding the foot structure. You can cheat sometimes by looking at the wear pattern on your athlete's feet and in their shoes, and their callus formation on their foot. Understand the difference between the severe pronation and take a look at their feet. See what muscles are more developed. See where their calluses are formed. Then look at their shoes. See the wear pattern of their shoes. Then you can really understand what type of foot strike they have and how they are using their foot. That also helps you make corrections, but it also helps you understand what is happening. If I am a supinator here, can you really appreciate how I am using my peroneal tendons way too much? Somebody like that is more prone to a peroneal tendinopathy or peroneal tendon rupture. I know if I have my supinator, I have got to try to get them more to that mid foot stance here. That way, I do not really stress that peroneal tendon now. Looking at those callus formation and the shoe wear pattern is a very important way of getting somebody better.

How do we understand the cascade of events that happen for injury? This is an avulsion of the growth plate of the great toe right here. This needed a surgical repair to get that growth plate back in. We worry about the growth plate of the toe, particularly in these youth athletes. What is the overall prognosis for that? If we start with this injury here, what is going to happen up the chain of command as they are growing? What is going to make up for the motion that they lose there? That is an interesting concept. As years go on, down the road, we can trace these injuries back to the first injury that created the faulty pattern.

For this particular athlete here, they had this injury early and developed chronic exertional compartment syndrome in the fascia. This is a cadaver. I work in the cadaver lab doing a lecture once a year, and I am always interested in compartment syndrome. It is one of the things that I do a lot of research in and reading on because it is one of those real stubborn things that a lot of people do not know a ton about. It does not get better. I am always looking at this fascia. This deep investing fascia that traps the nerves, the blood flow, the muscles, do not let things glide past each other. But if we look at the imaging capabilities, we really cannot see fascia very well. It is too thin, so it is under appreciated. I think we need to understand where the problem comes from and what are the long-term ramifications all the way up that kinetic chain even with something as simple as fascia.

As we are considering injuries and evaluating, we cannot go through this lecture without at least mentioning parental concerns. You need to be able to meet and consult with parents for youth athletes and explain the injury to them. Explain home care or explain referrals. If you need to get them to the emergency room or to a doctor,

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you need to be able to effectively communicate with parents. The best bet is always to just be honest and put your athletes' best interest first. That is an important component if you are working with youth athletes.

If you are going to be working on the field, be prepared for trauma. You might be in your office 99.9% of the time, but if you are asked to work in event, please be prepared. Understand what you need to do if someone gets injured on the field because you might see an injury that you do not typically see. As sports chiropractors, we need to be prepared for everything and we need to be equipped to handle everything, have the supplies necessary that you need, have an EMS emergency squad back up if you feel that you need that for that particular sport, make sure that the EMS is on alert or you have an idea how to get them there. A great example of that is I worked at a track event and we had a thermal injury, so someone with a heat injury and heat exhaustion. Basically, if I had not google-mapped the entrance to the track, which was not the address of the track ahead of time, the emergency squad wouldn't have gotten there in time. Because I had prepared and had told them that they needed to go through a different entrance on a different street, I would have not gotten them there. Make sure you are prepared with little things like that sometimes. Sometimes that makes a big deal.

This is an injury that I saw when I worked at a football event. You can see that his ankle is on sideways. This speaks to being prepared. What do you do in this scenario? What do I do if they have asked me to cover an event, and now this happens? You have got to go back to your basics. You have got to check for blood flow. You have got to check for sensation. Start with the basics. We always go airway, breathing, circulation. Well, we are going to go with, do we have circulation? Can you wiggle your toes? Can you move your toes? Great. Stabilized transport. Let us just be efficient and let us make sure we are doing the right thing for the athletes. Here's another view also of him. Once we got into the hospital, we took everything off and he has an open dislocation fracture of tibia and a fracture of the talus, so he required seven surgeries to get this ankle better.

I want you to also be aware of the patterns of edema. Always looking at this tells a story. Our typical ankle sprain will have this, dropping of this, a little bit of ecchymosis down here laterally. The injuries to the anterior talofibular ligament or calcaneofibular ligament, we will see this dependent edema for a typical ankle sprain, and it dropped down here. I worry about this little bubble here though and I want to look at the base of the fifth metatarsal there. Just making sure we do not have an injury there. We talked about that earlier. However, when this athlete flipped their foot over, I saw this. This does not worry me; this is run-of-the-mill stuff. I saw this. We have got to think about that because we know that the posterior tibialis tendon runs down here, and I have a little edema here. But the thing about the posterior tibialis tendon, it loves to shear vertically. It likes to start with a little tiny tear, and if you ignore it, it just keeps tearing up and up and up until you need surgery. Once I saw this, I am like, "We are going to put you in a boot and we are going to get you first an imaging just to make sure nothing else is going on before we start progressing." Just knowing those little nuances and taking the time to look at the athlete in all different directions and those patterns of edema is really important.

The way they tie their shoes is very important. I am the shoe Nazi of my office, but if we have lateral stability or we pronate a lot, if you use the top hole in the shoe and do what we call a runner's knot, they get a better control of their ankle. If we have good control of the calcaneus, the foot cannot pronate and supinate too much. We need to think about that. Good calcaneal control. Making sure that they are untying their shoes when they take them off and they are not just sliding them on and off because that will stretch out the top of the shoe and they will lose support. Here's an example of how I make all my athletes tie their shoes. This is called a runner's knot. You use this extra little hole at the top that nobody likes to use, look right here. You leave the loop there and then you cross the edges into the loops, there you go. Once you do this and someone walks around, they are like, "Oh, that is so much better." We do this. They are not going to come loose. It gives good support. It helps that calcaneus with support and helps you prevent a little bit of pronation. Of course, I always double tie the boat for them, so it does not come untied. Just like a little trick if you are working with somebody and you are seeing a little too much motion when you are looking at their gait, this helps control that a little bit.

Then being able to understand your x-rays, what is normal? This is an extra bone right here in the back, a flabella. This basically was read as a fracture, and this athlete was put in a boot for a period of four weeks. This is not a fracture at all. This was just an accessory bone. That is a normal variant for this patient. That was just

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inappropriate care on the part of the physician. After four weeks, how much atrophy do we have of a calf? That is now our big project to bring back. Whereas we had a mild injury, that would have been easy to bring back, now we have a complex injury. I have got to get a gait pattern back. I have got to get all the motions in the foot and ankle. All those 26 bones, 33 joints. I have got to get everything moving again in the ankle and I have got to get the muscular weakness. I have got to get the foot intrinsic muscle strength back. I have got to get proprioception back, gastroc and soleus back. It would have been easy. But after four weeks of immobilization, not so easy anymore.

Again, looking at these patterns of edema. This is a little higher. I am more worried about a high ankle sprain. When we see a regular anterior talofibular sprain, it sits in the sinus tarsi area here. When it is a little higher, I am going to make sure I am looking at the fibula for any fracture, but I am going to do that squeeze test, we talked about the squeeze test, to see if they have a high ankle sprain. That is really important.

I want you to look at these lateral views of this here. This is a ruptured Achilles tendon here. You see, there is no Achilles tone anymore and we can see that here's the Achilles tone. You can also compare that to this side here. That would be the big difference from side to side. That is an acute that just happened. About an hour before this exam, they came right to me.

Here's another trick. You can see when the Achilles is intact, we get that plantar flexion. We talked about the Thompson test where you squeeze the calf, and you get that passive plantar flexion. Well, when it is ruptured, you just do not have that. So now, they are sitting in a little bit of dorsiflexion, and that Achilles tendon is just ruptured. That is a good way to diagnose it, too.

Again, we talked about this case earlier. Here's that healed Achilles tendon surgery. We have to think about what everything is we need to fix as we bring somebody back to sport? Particularly if it is something of that nature. How many things do I have to correct?

Sever's disease is inflammation of the growth plate in the back of the heel and the calcaneus. As they have their calcaneus, you are going to palpate medial and lateral and they will have pain back there. It'll be pain more from repetitive trauma of landing on the heels. Our gymnast is huge and a youth gymnast, so obviously somebody with an open growth plate. We need to be able to manage issues like Sever's disease and wearing a heel cup or something that absorbs the shock or landing on soft surfaces or decreasing the number of repetitions that they do. These are all things we need to consider with Sever's disease. That is an active Sever's MRI right there with a lot of inflammation.

We need to consider the sesamoid bones too. The two bones are in the flexor tendon here, the toe. We need to think about inflammation in that area and pain. What type of footwear you wearing? Are you wearing enough cushion underneath your feet or are the sesamoids inflamed? That sesamoiditis is a very big deal because what happens is you lose great toe extension because the sesamoid bone here is inflamed, so therefore the great toe is not going to extend. Again, we talk about that great toe earlier, and how important that is to get that normal range of motion. If I do not have 55 degrees of extension of the great toe, I am not going to have a good running gait. If I have sesamoiditis, I have got to shut them down and pull them back from running and calm it down. Get a good cushion or donut around the sesamoids so that they can heal.

We have to think about how important that area is, and then as we look at somebody's feet, take the time to look at the callus formation here. How is she using her two feet differently? What is happening that she's pushing off of her toe? Is she pronating too much on the side? If she's evert and pronating on this side, is she pushing off more on this side, and that is why she has sesamoiditis? Really understanding the effects. What actually happens? What are the long-term effects?

We cannot look at the foot and ankle without looking at plantar fascia, plantar fasciitis particularly. We all are very familiar with this, where the plantar fascia comes down and attaches. Here they have pain on the medial calcaneal area inferiorly. They have an area of point tenderness. They can get little tearing or micro-tears or

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inflammation of the area. Best to have them in a more sturdy shoe, so not so much motion. They can do tennis balls rolls on the bottom of the foot, icing the bottom of the foot. We need to do some laser treatments and some massage. I do a lot of stretching of the extensor hallucis in that area. They tend to get better quickly. Just being diligent and making sure they are not walking without shoes in the house and that they are not too flexible with their shoes. This used to be a very common injury post-illness. They were in bed for a long period of time and they get out and start walking around and they develop plantar fasciitis.

A Lisfranc Ligament is the ligament that sits right here from the medial cuneiform to the base of the second metatarsal. With a Lisfranc injury, that is torn and they have a separation of the first and second metatarsal. That is a surgical repair. They need to have that surgically fixed. They can have a sprain where it is very mild in that area there. You will have the whole point tenderness there from that cuneiform to the base of the second met, but they can also have a rupture. And then that slides those two apart and that just creates a biomechanical disaster so they need to have that repaired. Here's a picture of a Lisfranc foot right here, post repair, years later. We can see what happens to the rest of the bones. Here was her injury. Here's the Lisfranc injury. We can see the rupture of that Lisfranc ligament and how that is going to change the separation. They will go in and they will repair that and pull that second met back over again. But just thinking about how that changes the biomechanics, and we have got to consider that with athletes as we try to return them to the sport.

We think about age and gender. Later on in your modules, you will have one module that is dedicated to the age and gender of athletes. But I thought it would be important to just mention. These are important considerations. What injuries are more predisposed in females versus males? We tend to see more trauma with males. They are a little rougher. They play a little rougher. They go a little further and harder out when they are in competition. We think about what injuries am I going to see different? What about age? I am going to see more Sever's diseases or more growth plate injuries than younger. In the Masters, I might see more fractures. Or I might see other types of injuries. A lot of soft tissue injuries. We are going to go over that in a later module, but I just thought we'd glanced over.

This is a master's track event that I worked on. We need to be able to be equipped for the older athlete, as well as the younger athlete. Not everybody is that perfect age. We need to be able to work with all ages and understand how I would treat somebody differently that is a different age.

Again, we talked a little bit about footwear. We need to make sure if we are seeing problems. This was an athlete that came to me with a long history of foot pain. Just watch this running gait. That is painful to even watch. There are so many things going on with this gait that I was looking at it for a period of time. Let us look at her side view before we give you the answer. I want you to see if you can figure out what is going on there. She is hyper-flexing her elbows. Her feet are rolling out. Her hips are tight. Her glute med is not working, peroneal tendons are overworking, she has valgus deformity. I could list ten things at least just to start with when we are looking at this gait. But I looked at her and there is just too much to add up with her complaint, so I just had a gut instinct. I looked at her shoes. We took her shoes off, measured her feet. She was wearing shoes, a size and a half too small for her. Once we got her a pair of shoes that were her size, all that cleared out. Sometimes it is not the obvious thing. It does not add up, again, going back to earlier in this lecture, we talked about the mechanism of injury. She had no mechanism of injury. It is just gradually over the years, it got worse and worse and worse. Well, her eval was not matching her gait so we just try something different. Think outside the box sometimes. Checking the footwear saved a ton of treatment and she was better immediately with a much nicer run.

This is an interesting one. A twelve-year-old gymnast reports with left ankle pain. Cutie patootie here. I look at patients statically from the side and from the front. I look at them actively, either I walk them on the treadmill if there is somebody that does that type of activity or run them. Or for a gymnast, I might have her do some skills for me and tell me when it hurts the most. But, this case was pretty interesting. She just got back from Disney, walked for seven days without pain in her foot in Disney. When they got home, the doctor called the mom and said she had stress fractures all in her feet, her left ankle, and she had to go in a boot. Well, the story is she just came out of a boot for the other side, the right side. She was in a boot for four weeks on her right side. She goes

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to Disney, walks without pain, she comes home, the doctor says, "The left side has stress fractures in it or stress injuries in it. We need to boot her for four weeks on the left side." They came in to see me, and I said, "Let us look at her. Let us look and see what is going on. Let us look at the whole kinetic chain." She's certainly off in multiple areas. We can see the pelvic un-leveling here a little bit and rotation of shoulder here. Hip internal rotation here. We can see pronation on that side. A lot is going on there.

Here is a closer look at her feet. You can see she pronates more on this foot here, but see, she puts more weight on your toes. She really shoots her weight forward on her foot, we look at how much they grab the floor with their toes sometimes. We will have a clue there. Remember, she came with left foot pain. Here's the MRI of her right foot. She has all this micro-fracturing of medial malleolus, remodeling chronic fracture, the edema, posterior tib contusion, and now her left MRI has the same.

We talked about trauma and everything mechanism of injury. When did it happen? She could not name a time or date. There is nothing new that she was doing in training. Guess what? It is time to think outside the box. You must go back and look at everything. You have got to look at everything when you look at a patient like that, that it is not adding up. She just walked in Disney without pain. We need to look at both and understand that now, she was booted on the right and sent back to activity. Now, she got the same pain on the left and they want to pull her activity again. The boot we talked about, the ramifications, muscular-wise, proprioceptive-wise, kinesthetic awareness-wise, and then repairing that. How long it takes for that.

But we need to understand that we have to look at the whole persona. What are the coaching issues? How many hours is she practicing a day? Tell me about her eating habits. Tell me about her sleeping habits. It turns out, which is very interesting with her, she had a very severe vitamin D deficiency. This was a long period of time that she went, and nobody looked at the obvious. I asked about her training, and she actually got to the gym at 8:00 a.m., practiced till 12:00, was able to home-school in the gym without leaving the gym for two hours. Then at 2 o'clock, she was back in the gym till 6:00. Well, there was no outside time. There was no sunlight time. There were no vitamins, so she was in severe vitamin D deficiency. Once we brought that on board, guess what, everything started to clear out. Do not be so laser-focused on the injury. We need to treat the injury, but sometimes you must back up and say, "Wait a minute. Why?" That is my big thing. We want to know the whys, not only just the injury. It is important to get that diagnosis right, but the why is the thing that I want to know. We can keep treating her for the next 10 years or we can give her vitamin D and get her better. Think outside the box sometimes and look at the big picture.

We saw this picture earlier, but I wanted to come back and go with the patterns of edema again. As we are getting further in this lecture, I want you to understand where those patterns sit and why. We had it wrapped tight and we can see where he did not have it wrapped and where he did have it wrapped because of those patterns of edema. Just knowing where their injuries are. Here's the medial ankle. No deltoid injury there. We certainly had an ATF injury here. Everything dropped down. But I am wondering about this edema up here. I am going to be looking to make sure there is no fracture there. Look at that and it tells you the story of what is going on. I find it quite interesting. Here is just a different view. I am looking at that distal tibia. Why is that color there? Mechanism of injury, history of previous injury, going back to what we said earlier. Where are they tender? Where are they sore? Can they bear weight on it?

Let us move past that. We cannot forget in this lecture about the posterior ankle. We talked a lot about the Achilles. You see this space in here, lots of room for swelling to sit. When someone has a regular ankle sprain, they are going to get that pseudo Achilles tendinopathy because the Achilles tendon is bathed in those inflammatory materials because that is where there is room to go. You have got to get that swelling out from behind the ankle as well because they will have that Achilles tendon pain.

Notice that retrocalcaneal bursa here. Here is a patient with acute Achilles tendinopathy. She has all the swelling in that Achilles area here, and all that swelling is sitting across there. Why? For this patient, you have got to go back to it was not an activity, she did not do anything different, she did not go on a vacation and walk anywhere,

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she is not wearing different footwear. What else do you think you can think of? I want you to just think about it for a minute.

This is medication-induced. We know about the antibiotics, levothyroxine class action suit for acute Achilles tendon rupture. I asked her about antibiotics and she was not on antibiotics but what she is on is chemotherapeutic drugs as she was a cancer patient. We know that certain chemotherapeutic drugs attack some of the tendons. Making sure that if you cannot figure it out, ask the next question. Are you on any medication? Let us try to get to the bottom of the why, and then she understands, oh, now I know it is from my chemo. We just have to figure out how to manage that when she is on her chemotherapeutic.

As we start getting towards the end of our lesson, I promised you we would talk about this marathon runner. I will let you watch and see if you can figure out what it was. We are going to watch it one more time now that we went through the whole lecture and now you know a lot about ankles. We will watch him walk. Remember, I said when I put somebody on a treadmill in the office, I like to see them walk first, then a slow jog, and then their race pace or your normal training pace. I put them through different cadences, and I watch everything. If the pain is when they are striking their foot down, I am going to look from the foot up. If their pain is when they are swinging through, I am going to look from top to bottom. Asking when they are having pain is important.

Let us look at a different cadence here. We are going to listen to the sounds the foot makes. I want to see if you can pick up the problem. It is right lateral foot pain. I do every cadence set 30 seconds. I like to see them 30 seconds from the back and 30 seconds from the side. There were no differences on the sides, so I did not include it in this slide deck. But I assume as I put them on, I said, oh I see it. You see how he's drifting to the left side of that treadmill? I am going to play this one again. You see how he everts his foot with every step. You see his right foot everts. Now he is lateral loading. He is going to peroneal tendinopathy, lateral calf, and then he's going to develop IT band. But you see how that is so powerful, that it pushes him to the left side of the treadmill, and he must work his way back, and then it pushes him again to the left side of the treadmill, and then he works his way back. You can see that little peroneal tendon acting up there.

We need to look at all those different speeds and we need to think about what is the kingpin? What I call the kingpin is what started the process. Again, we see with runners in particular, a lot of tendon pain and tendinopathy, in general, tend to crop up when you have a big change in regime. You are loading more, more repetitions, more intensity, different training, when things are changing rapidly. We can change their training slowly and not get as much tendon issues, unless we jump too quickly, that is when we tend to see the tendon problem. He did a nice job at training, so there was no change in footwear, there was no history of injury. It just really was a technique issue.

For him, his lateral foot, let us look at the next slide. Here is his right foot. Look at that peroneal tendon and let us look at the left foot. Not there. What I can do is I can treat him for peroneal tendonitis or tendinosis, probably at this point. Tendinosis is a poorly healed tendonitis. I can grasp them, I can stretch them, but if I do not fix his technique, and every time he steps, he everts. 2500 steps for every mile and he is a marathoner which is why I am never going to fix that. My treatment a couple times a week is not going to fix a technique for a marathon, so we have to go back and get him on a treadmill, and we have got to get him to correct this technique so that we can untrain the problem. Thinking about, why is this overactive? Is the posterior tibialis underactive? We think about these agonist-antagonist muscle relationships. We retrained him so he was not everting, and then while we treated the problem, we just kept cuing them and retraining them and the problem goes away. But again, do not just stop at that cheap diagnosis. Why?

We are going to look at foot and ankle injuries. Understand sometimes for injuries, emotional component is huge with a physical injury. I like to include a little bit of this with almost every lecture I do because I think we forget about it, that there is an emotional component with every injury that is left behind. Do not forget to be there to guide and to inspire and to give control to athletes. Athletes like control. Let them be an active part in their care. It'll be great for their overall emotion.

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This is an athlete here with chronic exertional compartment syndrome, had to leave her sport of gymnastics, couldn't wear tight pants because her legs turned blue, couldn't stand, couldn't walk, couldn't participate with friends. Very bad scenario. That was surgically released and not corrected. We did some fascial treatment in the office and got her back, not to sport, but back to be a normal child. Not good enough for sport. It was just too many years. But my point with this is the cascade of events that happened with an injury also are inclusive of emotional component. Please be able to unpeel that and refer the athlete if they need it for someone to talk to, if you do not feel comfortable talking, or at least encourage them to seek out some help. We do not want somebody like this. You can certainly see her affect. She's just not in a good place. We need to make sure not only are we treating the injury, but we are unpeeling a cascade of events that happen with the whole injury.

One of the last cases we are going to look at today is a stress fracture of the base of the fifth metatarsal. Here is a runner. He was a triathlete that had chronic right lateral hip pain that had cleared up years and years earlier and never returned again. Then he came in with this base of the fifth metatarsal pain. He had a stress fracture that repeated for approximately two years. I put him on the treadmill. Well, why does the stress fracture keep coming back? He says, "I do not know. Everybody's treated, I have done physical therapy, I have seen an orthopedist, I have taken time off. Every time I start again, the base of the fifth just gets injured again."

Here he is running, and we are looking at his gait pattern. As I am looking at him, I already had it figured out at this point, what was going on. But we still want to ask the question of mechanism of injury, terrain, change in training, footwear, what is his gait, what are his personal goals, what are your goals? If we look at his regime, let me see if I can just stop this and bring it back. You can see the problem here. Why he has this base of the fifth. I do not know if anyone can see it, but he is not using that right hip like the left. The right hip is a little everted. The foot is a little more everted than the left. Once I look on the treadmill and I get an idea of what else I want to look at, I take them off the treadmill, re-put them on the table, and re-evaluate them, I might take them on and off the treadmill several times as I am getting an idea.

I took him off and I looked at his hip because he said he had a history of hip years earlier but it never bothered him again. He had a severe loss of internal rotation of his hip. Once we corrected the hip, we changed his gait, and the fifth metatarsal stress fracture stopped happening. Again, thinking outside the box and really watching your gait makes a big deal. But also understanding this base of the fifth metatarsal. Where is the stress fracture? Are we at Zone 1 here? This is more for the youth athlete. This is more Salter-Harris fractures or avulsion injuries, somebody with growth plates that are open. If we have a Zone 2, this is our metaphyseal region. Our non-union risk is 15 to 30%. These are more of our acute injuries. But in this Zone 3, that is where a stress fracture happens. That is where they happen in athletes. I want to know first, well, where does your foot fracture all the time? Is it in the stress fracture area or is it in Zone 2? He's not really a candidate for Zone 1 as much from his age. But again, there is a high non-union risk here. But we need to look at our hind foot position because your hind foot position dictates how much weight goes on to your fifth metatarsal, and understanding these. Maybe think, geez, this is a gait issue, so let us look up the kinetic chain and see if we can figure out why. I could laser this. I could treat it but I am not going to correct the problem unless I travel up the chain and evaluate. As we get to understand that, we really come full circle with their whole ankle evaluation.

I hope you have gained some confidence in this lecture and having to evaluate the ankle and diagnose it and think about the functional component of the anatomy and the functionality that the athlete needs to return to sport, what your deficiencies are, and what corrections you need to make to get them back to sport-healthy.

I thank you for listening to me with this lesson and look forward to meeting you at some of the hands-on modules or seeing some of you guys in some events, hopefully working together side by side. Good luck. Looking forward to seeing you in the future.

[END]