

Dr. Travis Dekk...: Welcome to the Arthroscopy Association's Arthroscopy Journal Podcast. Welcome, everyone. I'm Dr. Travis Dekker from Eglin Air Force Base. Today, I'll be talking to my good friend, Dr. Brian Lau coming from my residency Alma Mater of Duke University. Brian is a driven and very forward-thinking young mind, helping lead Duke into its next generation of influence in the sports medicine world. He's a young investigator taking on projects and writing grants on how to best care for our patients by safely returning them to play in a very thoughtful but also very deliberate manner.

I recently had the privilege of being on the Traveling Fellowship with Dr. Lau and grew to appreciate his insight, as well as his out-of-the-box thinking as he tackles complex and dynamic problems common to sports orthopedic surgeons. Today, I'll be focusing on an article within Arthroscopy, Sports Medicine, and Rehabilitation published in January of 2022 entitled, Return to Sport After Shoulder Stabilization Procedures: A Criteria-Based Testing Continuum to Guide Rehabilitation and Form Return to Play Decision-Making. Welcome to the podcast, Brian, as I'm excited and eager to learn and apply the lessons you've taken away from this study and add it to my own practice. Brian, congratulations on all of your very early career achievements and contributions, and welcome to the podcast.

Brian Lau: Thanks, Travis, for the introduction. I really appreciate it. It was great traveling with you and learning from you on the Traveling Fellowship as well. It's a great time. Recommend that for anyone and everyone. It's also been great to see all the things that you've been doing with AANA and [inaudible], and you're carrying that legacy of the military experience of AANA and Arthroscopy, and I really appreciate all you've done as well.

Dr. Travis Dekk...: I appreciate it, man. We'll dive right in. You began your article making a super interesting observation in that the patients with the highest risk of recurrence, as in those contact athletes are the same patients with the highest expectations of return to full sport activities with no longer having to deal with instability as a problem. I do remember hearing time and time again at Duke that shared decision-making process by Dr. Taylor, that he shared with his patients. Can you comment on why you think these patients typically have the highest expectations and then go through how you counsel them on deciding between non-operative versus operative management in the setting of shoulder instability?

Brian Lau: Sure. Yeah. Thanks, Travis. That's a really good point. I think one of the biggest things is that a lot of these athletes with high expectations have the sense of invincibility. They feel they can do anything. They've obviously accomplished a lot in their athletic careers. So, these high-level athletes, and probably what makes them so successful in their sports is that they feel they're invincible and they really push the limits. But having those same high expectations can really lead to the high expectation after surgery, and have difficulties in terms of achieving some of those high expectations.

I think some of the keys in dealing with these high-level athletes or high performing individuals, as with the military, is depending on where they are in season. If they're in season, we generally try to rehab these [inaudible], and if they're able to tolerate, give them a little bit of rest a week or two, and get their motion back, their strength back, and try to get them through to season, especially depending on positions or sport, using things like a sully brace to help restrict that abduction external rotation, but really trying to get them through the season.

Now, if they've had multiple dislocations throughout the same season, then we would have a different discussion that maybe this isn't working, if we've tried, but our goal is to get them through the season. Then, at the end of season, reassess what their goals are. Are they a senior? Are they graduating? Are they going to continue to play? Are they doing other recreational sports or other sports that they want to get back to that would be high-risk? That's how we deal with the seasons, different sports here.

Then, the biggest things is if they're recurrent. So, if they've had multiple dislocations, and we're looking at their imaging, and we see a lot of bone loss and difficulties, and they're having a lot of apprehension on their exam, then we're going to be talking to them about surgery over non-operative management and discussing the risk and that if they were to continue to play and do the things they want to do, that they may have further dislocations and risking more bone loss. The more bone loss you have, we know that the higher risk and that subsequent surgery may not be as straightforward. That's how we talk with them about whether to do surgery or not surgery.

Dr. Travis Dekk...: Well, super insightful. I think very practical as well, helping guide treatment, especially the in-season athlete, I think can be one of the most challenging things that we deal with as team physicians, and of course, very methodical in how you've approached that. I think that reading further on is that your manuscript clearly brings up the point that time as the sole criteria return to sport, may not adequately return athletes safely back to sport. Can you comment on this and why this remains such an important aspect of postoperative care, specifically time-based approach?

Brian Lau: Yeah. I think that was a really interesting observation that we had as we were reviewing the literature that, in a lot of things in orthopedics, time is a major factor, and really, shoulder instability seemed to be the sole factor in a lot of things. [inaudible] the [inaudible] review [inaudible] published in Arthroscopy 2018, went through 58 studies of shoulder instability, and just tried to see what people were using, and what they found was that in close to 80% of these studies, time was the only factor that people were using to decide to return to play, and most of the time, that was six months. And it's interesting, you think about athletes, and one, probably the most important question that we have is, when you're going to be able to return to play. And for that very critical question in terms of shoulder instability, we're really essentially using level five evidence.

It's just based on what someone thought would be a good time point, and I think we can do better. And another thing that study noted was that the most common things that people are even assessing to say, "You can get back," is just strength and stability on your exam in the clinic. And they weren't even done objectively. They're mostly done subjectively. So they were just like, "Oh, they have full motion," or, "Near normal," or, "Good [inaudible] stability," was the most common phrases that were used. And really, if you think about it, that's probably not good enough. I think that when we're talking about high-level athletes and military individuals trying to get back to really high-level activities, you can do a better job of making sure that they're safe to go back and they're doing this at an appropriate time.

In fact, there was a paper recently published in JCS, by Drummer et al., where they said that using any objective criteria, and they had a couple tests that they used, but using their objective, any criteria and using that as a baseline decreased the rate of recurrence of shoulder instability by almost 5x, 4.8-5x. So, just having something you lean on to show objective evaluation and determination of return to play is better than just saying subjectively that they feel normal. I think most of us who do shoulder instability [inaudible], patients can have full strength and good range of motion when you're seeing them in clinic, but really, how are they doing when they're being functionally pushed to the limits, when they get a little fatigued? And so, that's where I think that we saw there was an opportunity to advance that and really kind of look at this more closely.

Dr. Travis Dekk....:

Well, Brian, one thing that I really took away from you, especially from the Traveling Fellowship is that phrase, "I think we can do better," and I think asking these questions is extremely important, and being able to see articles like yours and specifically, I think that the sister journal of Arthroscopy does an amazing effort bridging that gap between surgery and rehabilitation to allow and promote us to better counsel our patients. In your article, you described the three P program. Can you go through that with us? And also at what stage in the care process of your instability patients are you discussing this three P program specifically?

Brian Lau:

Sure. Yeah. I think the three Ps, what they stand for, are performance, practice, and play. And I think where this comes in is after they've had that return of strength and stability, and trying to try to get them back to that high-level activity. So, that's when we're implementing this. So, maybe at, generally speaking, is around the four month period when they've cleared the general strength and range of motion, and getting that back, we will go through this three Ps, and then it is what it is. We're doing things that are related to the things we're trying to get back to. That's the performance part. So, we're trying to get them back to what they're doing. So, if they're overhead athletes or there are contact athletes, we're doing exercises, and drills, and training to mimic and reproduce the things that they're going to try to get back to.

The practice part is that you can't just do it a few times. You got to do it over weeks to really retrain the shoulder, retrain the muscles around it, and regain that stamina and endurance, and then play is when you're gaining to play. And so now, you've reached that level where you've got that performance back, and you've practiced it enough times.

Term that's used a lot now, and you hear a lot about load management. So, when you're returning them back to play, you clear them, saying, "You're cleared back to play," it doesn't necessarily mean they're playing a full football game anymore. Maybe they're playing half the time or a quarter of the time, and they're slowly working their way back. And that's the play part of it, and really following that kind of gradual thing back to make sure that it's not just their general stability, but their overall function of their shoulder and stability, and their confidence in it has a chance to build, which I think is probably one of the bigger things that we are trying to hone in on as well, is the general confidence and psychological factors that come into play, and when we're trying to return to sport.

Dr. Travis Dekk...: Well, Brian, that's great. That leads into my next question because the military and Dr. Tokish has really led the way with talking about resiliency in their ability to cope with their injury, along with having the psychologic confidence back in their shoulder. It seems to have a very large role in the prevention of recurrence. Can you comment on your findings along these lines specifically? And additionally, let us know if you're using any patient reported outcomes currently in your practice to help guide your decision in allowing them to return to play?

Brian Lau: Yeah, and I think your points are well-taken in terms of them, I think there's greater and greater understanding that there's definitely a psychological factor in terms of safely return into play, and there's a lot more knowledge understanding the role of kinesiophobia. So the fear of basically having a re-injury. I think anyone's had a major injury can speak to that. And again, back to activities, the first few times you get back can be kind of nerve-wracking, and [inaudible] yourself, but also your family members. And there are lots of parents who come in say, they're so nervous about their kids getting back to sport. So, kinesiophobia as well as psychological readiness is I think a really key component of rehab, which we're trying to focus in on and make sure that we that's a factor when we return patients back to play.

And part of that is using the patient-reported outcomes as you mentioned. The one that we find a very useful. For instance, shoulder instability return to sport index. We also use the Kerlan-Jobe Orthopaedic Clinic shoulder to elbow score, the KJOC score, which has been shown to have the ability to predict injury risk. So, depending on your score level, greater than 90 or 95, on that scale can help predict whether or not you're going to have a chance of having re-injury. We also use the WOSI score, the Western Ontario Shoulder Instability index score, as part of our return to sport batteries. That's a very commonly used survey, and so we do incorporate that as well.

Thinking about the psychological, the first thing, as I mentioned is make sure you get that strength and range of motion back, then you start working on that three Ps, and should build that psychological readiness through the amount of the practice and the play part of it. As you slowly gain back, help get that confidence, and you really get that edge back that athletes really talk about and need to get that peak performance.

Dr. Travis Dekk...: Super in depth analysis that you guys have gone through with this. And one of the things that I found so fascinating about your manuscript was the protective differences, postoperatively comparing upper and lower extremity surgery. Can you walk us through how rate of force and peak force differ in the rehabilitative phase, and why this is important?

Brian Lau: Yeah, and I think that was something that I learned as we're putting this together, and probably didn't appreciate it first. I'll to hopefully help them make sense here. The performance piece of it is, during the three Ps, and you're trying to build back up to full game readiness. And the basic range of motion strength testing with clinic evaluation and [inaudible] diameter is good for that, but isn't really sensitive enough to pick up the level of performance, strength, and function. And in particular, when we think about shoulder instability, as we all mostly know, is that there's static and dynamic stabilizers. So, static stabilized being the labrum, and the bone shape, and the dynamic portion of it really being the muscles. So, when we're thinking of the rates versus the peak, so peak is what the maximum is, how much... So if I were to give an example, a maximum force, generally speaking, is a hundred Newtons that you can [inaudible] from your shoulder. This is just made up numbers just off the top of my head here.

But then the peak is how quickly you get to 100. So, let's say it takes a hundred Newtons for your shoulder to dislocate, and your peak muscle force is 120. So, once you get to peak, you're safely not going to dislocate, but if it takes you five seconds to get to 120, it doesn't matter that your peak muscle force is higher, you dislocate within a few milliseconds, so you're not getting there fast enough. You got to get there faster.

And that's why the rate of force is also critically important, not just the peak. So, you get the peak and maybe it takes you five seconds to get there, but it's just taking too long, which is why we think it's important to be looking at that and why we're incorporating performance testing when we're thinking about return to play because then we can get those numbers and really assess, at that level, when they game back into play, when they're trying to react to something, if you're talking about milliseconds, whether something's going to dislocate or not, is if your body's ready to get back to that, and the muscle, and their overall function rehab has accomplished its goals.

Dr. Travis Dekk...: Well, I think that's a takeaway that probably a lot of us are going to learn from this article in terms of these rehabilitation differences, and how thoughtful it is to think about the amount, just like you were going through, the amount of

force that would be required to be both protective and preventative to help decrease recurrences. It is just a very interesting idea, and I think could lead to future studies, and how we can safely get people back. Going further down, you all notice, and I think this is becoming much more apparent in the literature is, the difference between types and causes of anterior versus posterior instability mechanisms and acuity. Can you discuss how you address these patients, and do you have them differently? And what measures do you apply between these two separate populations to safely return them to sport?

Brian Lau:

Yeah, I think that's, as we get to the later phases of the three Ps, as you mentioned, this is where we start thinking about, what is exactly you're trying to get back to? And I think, in general, the key is to make sure you have a close relationship with your therapist, if you're dealing with, for us here, luckily we deal a lot of D1 athletes in our sports teams here at Duke, and we have very close relationships with the trainers... And the trainers and a lot of our therapists here do have specializations, so we have people who are focused on certain sports. Obviously, the athletic trainers working with the teams are focused on the one or two teams that they're working with, whether that's soccer, or football, or basketball, they know that sport, but even within our therapists here, they are also focused on certain sports.

And generally, it's a sport that they've done before, so they understand the demands, and the different psyche, and timing of the seasons and all that stuff too. So, they know how to kind of incorporate that into their rehabilitation. So, that's probably the first layer of really working that in and addressing the different sports. How we assess them differently, so when we're getting to that three Ps portion of it, we do two main categories: the contact sport or the overhead sport athlete. And there are different exercises that we use to focus on, and also different testing that we use to give that final clearance. So, for our contact athletes, so you're thinking an offensive alignment, who's doing a lot of straight arm blocking, we think of this more of like a closed-chain activity where they're going to... And so we actually focus on a lot of closed-chain activities and training and rehab during that period, and we use testing to test that closed-chain to make sure that they're ready to go back.

So, a couple of the tests which we described in the paper is a closed-chain, [inaudible] upper extremity stability test, [inaudible] push your shoulder endurance test, and then a wide balance test. All of these are closed-chain testing that we use for our contact athletes. The overhead athlete, if you think about it, it's really an open chain. So, you're a throwing athlete, a javelin thrower, a baseball player, most classically, it's open-chain activities. So, we're going to be open-chain rehab, and drills, and activities to get them back, and then when we test them and we're trying to give them that final clearance, we're also doing open-chain testing to assess them. So, we're focusing on how we're training them, but also how we're assessing them based on these two general categories. And obviously, there's some, when we talk about different drills, each sport's a little bit different, but this is how we generally classify them

into contact and overhead, and focusing our rehab and our testing based on that, in that final portion of their rehabilitation.

Dr. Travis Dekk...: Well, Brian, thanks once again. Thanks for joining us on the podcast, and taking time out of your busy schedule. It was a true pleasure, and I had a great time connecting with you over the AANA Traveling Fellowship and learning from you along the way. I greatly encourage any listener out there that has considered it to seek out that opportunity as you learn more from your peers than anybody else, and Brian was a great example of that for me. One last takeaway for us: could you take us through the general framework of how you're rehabbing your patients safely back to their respective sports?

Brian Lau: Sure. Yeah. I think that... Our first goal is kind of regaining the static strength and range of motion. So really, early on, I think that, and everyone, I think, does a good job of that and testing that in clinic. We can have a generally good idea of when their good static strength and good range of motion's back to normal. Around the three or four month mark, depending on how well they're doing with that, is when we begin our testing. So, we actually do our functional testing starting at that point, which we tell our patients that they're most likely not going to pass that first time they take that test because they haven't done it before, and we're testing them to the level that we're trying to hope that they can get to return to play, but what it does is it gives us a baseline of how well they are and what they need to work on, including psychological readiness.

So, that is part of that. We do that every time we test them through these performance testing. And then, once at that point, around that same three, four month part when we're doing that first testing, is when we're beginning the three Ps portion of it. So, the sports-specific strengthening, training, exercising, and testing, and we're testing them at that point a four month and then at six months, we retest them after they've had the chance to go through some of that drills and exercises in rehab. And we're testing them again at six months, and then if they pass the testing at six months and they're cleared, and that final P is that play portion where they're have that load management as they're returning back to play. If they don't pass their test at six months, we generally take retesting them every one to two months, depending on the timing of the start of their season.

So, how quickly they need to get back if they have the luxury of time. Of course, we like to give them a little bit of extra time to get back, but if the intervals are hurried because the season's coming in close, we'll retest them in a shorter interval. But we do want to make sure that they clear that testing, that objective criteria, not just subjectively patients saying that they're doing well. And we review this each time that we do that with the athletes, the coaches, and the trainers, to make sure that everyone has an understanding of what progress is. They have numbers they can look at, and what they need to get back to. That was not just a feel thing, that there's numbers backing up what we're thinking about, and why we're doing the different things. And then, when we meet those criteria and we return to play, everyone can be on the same page and the

agreement, as well as the athlete, that it's safe to return to play and they can do it with full confidence.

Dr. Travis Dekk...: Brian, can't thank you enough, man.

Brian Lau: Thanks, Travis, for inviting me. This is great, and happy to chat more if anyone that has questions, and really appreciate all you're doing. I think this podcast is a great way to disseminate information and for education. So, thanks Travis.

Dr. Travis Dekk...: This is Dr. Lau's Arthroscopy, Sports Medicine, and Rehabilitation article that was published in January of 2022, entitled Return to Sport After Shoulder Stabilization Procedures, A Criteria-Based Testing Continuum to Guide Rehabilitation and Inform Return to Play Decision-Making. This can currently be accessed at www.arthroscopyjournal.org. We thank you all for joining us and we hope you all have a fantastic evening.

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