Dr. Chris Tucke...:

Welcome to the Arthroscopy Journal podcast. I'm Dr. Chris Tucker from the Walter Reed National Military Medical Center and founding editor of the podcast. Today we're discussing the surgical management of anterior shoulder instability in athletes with hyperlaxity.

For this episode, I'm excited to be joined by Dr. Buddy Savoie, Ray Haddad professor and chair of Department of Orthopedic Surgery, Tulane University. Dr. Savoie is a well-known and respected shoulder and elbow surgeon with a long history of education, training and leadership, and I'm honored to be hosting him today.

Dr. Savoie was the senior author on the article titled Bankart Repair with Subscapularis Augmentation in Athletes with Shoulder Hyperlaxity, which was published in the July 2021 issue of the Arthroscopy Journal. His co-authors include Marco Maiotti, Raffaele Russo, Antonio Zanini, Roberto Castricini, Gianluca Castellarin, Steffen Schröter and Carlo Massoni.

Buddy, congratulations on your work, and welcome to the podcast.

Dr. Buddy Savoi...:

Thank you, Chris. It's an honor to be here. I really appreciate you having me and allowing me to at least discuss a little bit of Marco and Raffaele's great work in this area.

Dr. Chris Tucke...:

Well, I'm really excited to talk about this article in particular, so let's jump right in.

Can you set the stage for our discussion by giving us some background context on how you became involved in this, and also where the idea for this procedure of subscapularis augmentation originated?

Dr. Buddy Savoi...:

Sure. Basically when we're talking about multidirectional instability or hyperlaxity, this is a separate group of patients, and they have additional pathology. In the US, we primarily separate them into traumatic instability, which we see common in our collegiate athletes, our high school athletes, and then multidirectional instability, which is often thought to be atraumatic as [inaudible] discussed.

But as we all know, there's a blending between two and in hyperlaxity and true Ehlers-Danlos, Beighton Type 9 or Moore classification, there's laxity and sometimes tearing of the coracohumeral ligament and the structures of the rotator interval.

So the whole idea behind this is that we needed a way to sort of reconstruct that coracohumeral ligament and provide that extra bit of stability to the procedure. When there's a blending of trauma, i.e., a Bankart lesion superimposed on hyperlaxity or multidirectional instability, then you have additional pathology that you have to correct. So Marco's idea stemmed from

something we did a long, long time ago before anchors even existed, where we did a transglenoid repair, and we would put stitches in the subscapularis in the superglenoid humeral ligament and pull that upper border of the subscap to try to reconstruct the coracohumeral ligament.

Well, once anchors came out and went out of favor, I think that appreciation of that extra anatomical defect that occurs in these more laxed individuals sort of went by the wayside, and Marco and Raffaele and his group from Italy are the ones that resurrected it. We happened to be talking in Greece a few years ago, pre-pandemic. They were talking about it, and it was clear that the anatomy of this particular patient group really needed to be explained better. So we decided to put a series together, which we did, because there's a specific indication for this operation, and when you have that indication, it works very well.

Dr. Chris Tucke...:

I really enjoyed hearing that background. I think that sets the stage nicely and just enjoy hearing the context of how this paper came about.

Before we get into the details, I wanted to talk a little bit about the inclusion criteria for this study, in particular, as you mentioned, included collision in contact sport athletes, recurrent anterior instability with shoulder hyperlaxity and specifically glenoid bone loss less than 15%. Just to ensure our listeners are clear on this criteria, would you mind just reviewing for us the clinical evaluation of shoulder hyperlaxity according to, as in this paper, you used the Neer and Coudane-Walch tests, which were used.

Dr. Buddy Savoi...:

The Neer is basically a sulcus in adduction that does not really diminish with external rotation, so that's your inferior sulcus sign. The Walch test is hyperabduction without the scapula moving, so you bring the arm up and normally in everyone is going to stop at 90. In these hyperlaxed patients, it goes on up to about 120, maybe even higher because the hedges drops down inferiorly. So they're both talking about the same thing in terms of a sulcus sign or a hyperinferior movement of the humeral head in relation to the glenoid because there's no inferior stability and the coracohumeral ligament is dysfunctional by definition in those two tests.

Dr. Chris Tucke...:

Great. So along those same lines, the glenoid bone loss was assessed on CT scan using the PICO area method. Can you just briefly review for our listeners that technique as well?

Dr. Buddy Savoi...:

Sure. PICO method is actually the most sound way to measure glenoid bone loss when you're just looking at the glenoid because you CT both shoulders, and you superimpose the two together. So you have a normal glenoid on one side and you have the abnormal glenoid on the other side.

In Europe, they pay much more attention to subcritical bone loss, and so we chose in this group, Marco did, especially, that it would be less than 15%

because, by definition, it's a whole different study when we have more than 15% plus coracohumeral laxity when you add some more things in, in addition to the bone transfer for it to be effective. But that's a different group not studied in this paper.

Dr. Chris Tucke...:

So I admit I'm fascinated by the theory behind this procedure and the rationale of how it attempts to address the aspects of the pathophysiology, what happens when you have a traumatic anterior shoulder dislocation.

I wanted to hear your thoughts on this, perhaps, maybe in two parts. First, I was hoping you could describe for us the actual surgical technique of this subscap augmentation for the arthroscopic Bankart repair and what that looks like in your hands. Then, secondly, we'll go into what you referred to as the triple effect of the procedure.

Dr. Buddy Savoi...:

Okay, so let's talk about the first part. It's not really, and most people, when you first hear about this, will think of it in terms of Mag-Stack or a Putti-Platt, and it's not a shortening of the subscapularis. It's actually a reconstruction of the coracohumeral ligament. Anatomically, you look at the coracohumeral ligament as it comes off the base of the coracoid, there are two parts. One goes to the superspinatus and one crosses over to the subscapularis.

So what we're, in effect, doing is you have a lax upper border of the subscapularis by definition in these patients, that interval is split, the subscapularis is loose. Since we all know that the subscapularis tendon can be divided into three parts, an upper, middle and lower part, and you can distinctly test those on physical exam with bear hug, belly press and lift-off, we can come back and take that upper border of the subscapularis, place an anchor in the glenoid, and then go through the subscapularis and pull it to the glenoid, in effect, correcting or basically reconstructing a coracohumeral ligament that then closes the interval and keeps the shoulder from dropping out essentially the back. So you support it upward by reconstructing that ligament.

Dr. Chris Tucke...:

Yeah. Again, I find that fascinating. I think the way that this was described in the paper as well was really exquisitely detailed, which helped me to kind of even further understand this subpopulation.

Later in the paper, in your discussion, you referred to this triple effect of the procedure and how it differs from those historical procedures you just mentioned, the true subscap tenodesis of the Putti-Platt or the Magnuson-Stack. Can you just kind of in detail for our listeners go through that triple effect of what happens when you do this procedure?

Dr. Buddy Savoi...:

Absolutely, and it's a real tribute to Marco and Raffaele and all of the co-authors on how this worked out, because it's a true understanding of the pathology of a combined traumatic and hyperlax instability.

In this particular patient group with this, for our US listeners, multidirectional instability, by definition, the upper part of the subscapularis is stretched out. The rotator interval was torn by the traumatic instability, and then you have laxity of your coracohumeral ligament from the hyperlaxity or multidirectional instability component so you have two essentially coexisting pathologies. So then we look at it as the shoulder became more currently unstable, that upper subscap border stretched out more, the coracohumeral ligament became more deficient, and the upper capsule drops inferiorly, which was basically the premise of Neer's open capsular shift. He would move the capsule up and actually close the rotator interval.

So we're sort of circling back to the past, we're just doing it arthroscopically. So then we come in and on the stretch part of the subscapularis, we're tightening that upper border by attaching it to the glenoid without causing the middle or inferior parts of the subscap or the muscle belly itself to be involved so you don't lose external rotation. By going through that in the middle glenohumeral ligament, we're now reconstructing essentially that anterior capsular insufficiency and by pulling it down, we've reconstructed that coracohumeral ligament. So it's a triple effect in this particular patient without really shortening the subscapularis.

Now, if you were to do this procedure in a non-hyperlax individual without stretching of the upper border of the subscapularis, you would lose external rotation. So the distinguishing characteristic is these patients are selected ahead of time, as opposed to popping the scope in and going, "Oh, I think it's a little bit loose."

Dr. Chris Tucke...:

Sure. I think that was a beautiful description of a very complicated scenario.

I think now that we have a pretty firm understanding of the methodology and the theory behind this study, can you just summarize for us the key findings of this particular cohort?

Dr. Buddy Savoi...:

Yeah. This is a very high-risk cohort, Tom. In this group recurrent instability occurs quite frequently without these added surgeries, probably 25, 30% of the time. So what Marco, Raffaele and the guys found was that while our functional outcome scores, [Roe] and ASES improved considerably, as did the Western Ontario Instability Scale, the big thing for me was atraumatic re-dislocation was 1.5, 1.6% and then traumatic was 2%. So basically the total recurrent instability in this group was 4% and this was with very close follow-up. We kept good motion. There was about a 15-degree external rotation deficit with the arm at the side.

And essentially when you look at this, which you have to remember is that's actually normal external rotation, these people have hyperexternal rotation on both sides because of the hyperlaxity. So that's actually normal range of motion. Then the return to sport for this group was 87% with no limitations and about another 8% with mild limitations. That's about as good as anybody can do

anywhere. So my Italian colleagues should be congratulated on this fantastic result.

Dr. Chris Tucke...:

I agree. That's quite remarkable, and a nice segue into my next question, which centers around management of shoulder instability in general, particularly within this challenging patient subpopulation.

This technique needs to, obviously, be considered in light of other options to include commonly utilized surgeries that may be applied in this scenario, like the isolated arthroscopic Bankart, which you alluded to the high failure rates, but also these so-called Bankart plus augmentations, whether that plus is Remplissage or other techniques like an open Bankart, or even bony augmentations, like the Latarjet. I just wanted to hear your thoughts on how you think this technique compares to those other options in terms of the outcomes, but also the potential cost-benefit ratio.

Dr. Buddy Savoi...:

Well, I think it's almost like comparing apples and oranges, and this is where we always run into problems when we consider shoulder instability.

This is a set group of patients with additional pathology, so they usually don't have a deep Hill-Sachs lesion, they don't have a lot of bone loss, they are hyperlax. So we have to, in this group of patients, do extras in terms of addressing the rotator interval. This is one method of doing it that's probably within everyone that does shoulder arthroscopies armamentarium, so it was an honor for all of us to work together on it.

The other things you could do would be a large rotator interval closure where it's three, four, five stitches, but many times there's not enough tissue there to really get that done as well as you would like.

Then in extreme cases, I've actually grafted with a gracilis allograft and reconstructed both the superglenohumeral ligament and coracohumeral ligament by attaching it just anterior to the biceps, bring it out under the coracoid back over on itself, and then attaching it over to the transverse humeral ligament. That's when it's truly deficient. So I think if you can recognize this and know that the patient needs this, then it's something in between.

It's actually, and you're at Walter Reed so you know Bob Arciero, he's been a dear friend for 30 years, but it's one of the things that Bob talks about with the open Bankart that you can address. You don't do a Remplissage when you do an open Bankart, but you can tighten the capsule, put some extra stitches and close the rotator interval. You can reset subscapularis up a little bit and really reconstruct that upper border when you do an open Bankart, especially if you take down the upper border and then you can move it over a little bit to recreate your tension. So this is an arthroscopic method that's equal to open Bankart, in my opinion, in reconstructing that anterior superior corner.

If you turn into a traumatic where you have a little bit of glenoid bone loss, a reasonably deep Hill-Sachs lesion, no real rotator interval laxity or problems, then a Bankart plus Remplissage is good. If you have 20, 30% bone loss, then you have to restore bone to put it back together. So it's almost like you have your tree upside down and you go A, is primary Bankart lesion, B is mild bone loss with a Hill-Sachs, C would be a lax patient who has a traumatic instability on top, and that's where this fits, as opposed to a major bone loss patient where you have to restore bone.

Dr. Chris Tucke...:

Sure. I think that's a really nice way of kind of dividing it up in the different buckets, so to speak, that these patients fall into, seem to have a fairly clear distinction between them. Often in real life, there's a little bit of overlap.

I was just wondering I know we've emphasized the indications for this being the hyperlax patient to avoid that over-tensioning and that loss of external rotation. Do you think there is any potential for application of this to expand beyond those with laxity, either into a higher degree of bone loss category, or you think this is really going to be limited to the hyperlax patient?

Dr. Buddy Savoi...:

I think this is a target that if you do this in a non-lax patient that you risk losing more motion.

Now there are patients, we all know these, that are down here would be an offshore oil worker with instability, didn't have a lot of bone loss, really doesn't care if he loses 20 or 30 degrees of external rotation. And as long as you don't over-tension it, then that might be a good thing just to supplement because it's a high-trauma job, high work, and that would be something you could add in. I've actually done that on some of those folks to keep them stable.

It's something that you can consider adding to revision surgeries when you go back in, if you're not doing... A lot of people sort of knee jerk, I guess, go to bone restoration if you fail in instability. But this is a nice technique for a failed traumatic where they've had prior surgery, maybe some of the rotator interval has been excised for visualization purposes. This is a really nice thing to add in those cases, because now you're reconstructing your rotator interval utilizing a little bit of the upper subscap.

Dr. Chris Tucke...:

Interesting. Yeah. It's neat to hear how you apply it kind of outside the borders a little bit to the right patient.

Were there any surprising findings in this cohort or in this investigation?

Dr. Buddy Savoi...:

I think the biggest thing was the lack of recurrent instability. This is a high-risk group. When we first talked about it, I said, "Well, if you can get by with the 10% failure rate, you're in pretty good shape," and it actually came out much better. So I think this is an incredible, incredible addition to the literature. You know, Marco, Raffaele, all of the guys, it was just remarkably done, very well-

researched, patients were followed so carefully that I hope it gets a lot of play and people consider it because I do think it adds a lot to our reconstructive techniques.

Dr. Chris Tucke...: I agree. I think this is fantastic and hopefully, like you said, it gets some traction

and gets some attention.

Do you have any other parting thoughts or comments for us before we

conclude?

Dr. Buddy Savoi...: No, thanks. It's an honor to be a part of it. I really appreciate you taking the time

to discuss it.

Dr. Chris Tucke...: Well, thanks, Buddy. I wanted to congratulate you and all of your co-authors

again, who you've given a lot of credit to deservedly, on this really fascinating work, and thanks for sharing your time and your thoughts with us today.

Dr. Buddy Savoi...: My honor. Always a pleasure, Chris. Thank you.

Dr. Chris Tucke...: Dr. Savoie's article titled Bankart Repair with Subscapularis Augmentation in

Athletes with Shoulder Hyperlaxity can be found in the July 2021 issue of the Arthroscopy Journal, which is available online at www.arthroscopyjournal.org.

This concludes this edition of the Arthroscopy Journal podcast.

The views expressed in the podcast do not necessarily represent the views of the Arthroscopy Association or the Arthroscopy Journal. Thank you for listening.

Please join us again next time.