Chris Tucker:

Welcome to Arthroscopy Journal podcast. I'm Dr. Chris Tucker from the Walter Reed National Military Medical Center and the podcast founding editor.

Today in the podcast we're discussing augmentation of rotator cuff repairs. I'm honored and excited to be joined for this discussion by Dr. Patrick Denard from the Oregon Shoulder Institute. Dr. Denard has a worldwide reputation for excellence in shoulder surgery, having trained in fellowship under both Dr. Steve Burkhart and Dr. Gilles Walch, and now has been in practice in his home state of Oregon for the last 11 years.

In addition to publishing over 200 research articles, book chapters, and books, Dr. Denard is the director of the Oregon Shoulder Fellowship, a clinical associate professor at Washington State University, clinical instructor at the Oregon Health and Science University, and the chairman and founder of the Pinnacle Shoulder Meeting.

Dr. Denard was the senior author on the infographic titled Dermal Allograft Augmentation for Rotator Cuff Tears, which was recently published in the November 2022 issue of the Arthroscopy Journal. His co-authors include Ignacio Paqualini, Mariano Menendez, and Javier Ardebol.

Pat, congrats on your work and welcome to the podcast.

Patrick Denard:

Yeah, thanks a lot for having me on, Chris.

Chris Tucker:

Can you start by telling us a little bit about yourself and your practice as well as your background in shoulder surgery and what led to your particular interest in rotator cuff tear pathology and surgery?

Patrick Denard:

Yeah, I mean, as you mentioned, I'm a native Oregonian, so for me, after I trained in fellowship with Steve and Gilles, it was natural to come back to Oregon. My initial interest really was shoulder arthroscopy. I came to shoulder arthroplasty sort of secondarily, and rotator cuff, especially massive tears and irreparable tears has really been a passion of mine since I was in training.

Chris Tucker:

Before we get into the specifics of this infographic and the technical aspects of this patch augmentation for these large and massive rotator cuff tears, I was hoping you could just briefly set the stage for us by reviewing from a slightly larger perspective, your overall approach to the patient with the rotator cuff tear.

Could you just discuss your evaluation, your counseling, and the decision-making thought process with respect to management? I wanted to hear about how and when you decide on the surgical versus nonsurgical treatments and how you manage patient expectations.

Patrick Denard:

Yeah, really good question, complex topic. The biggest thing that I try to do is I try to match what the patient wants, or the patient expectations to what I can offer. I think that it's important, first of all, surgical, non-surgical, if it's a chronic tear, we're almost always going to start non-surgical with these

massive tears, especially if they're over the age of 60 to 65. I'm more apt to repair right out of the gate if they're acute tears.

But then when it comes down to the function, I kind of look at three broad categories. First of all, I look at the patient has any arthritis. And what I'm looking for there is really asymmetric joint space narrowing.

The second category I look at is their function, and if the patient has preserved overhead function or has pseudoparalysis but has had that for less than three months, so it's relatively acute, I'll be more apt to look at arthroscopic or joint preservation options.

And then the third category for me is the tear pattern itself, looking at it on MRI. And what I'm looking at there is the degree of retraction and the amount of fatty infiltration, which we're kind of going to get into later with the rotator cuff healing index.

But generally speaking, I'll look at those big three categories, and if two out of the three favor joint preservation, I'll be looking at an arthroscopic option versus if two out of the three favor more arthroplasty, I'll look at more of a virtual arthroplasty, assuming we're going in surgical direction.

So an example would be if somebody has maintained overhead function and no arthritis, that is they don't have adaptive changes et cetera, but they have significant fatty infiltration, perhaps even some other irreparable signs, I'll still look at that patient as somebody who is a candidate for arthroscopy because they already have overhead function. Versus conversely, if they've been able to raise their arm for three months and they don't have arthritis, but they have all these other signs, I'll be thinking reversal shoulder arthroplasty. And that's really just trying to put together all these studies in a quick way to think about it. And then from there I'll match down into exactly what the patient desires in terms of their specific function, et cetera.

Chris Tucker:

Sure. I think it's a wonderful approach to matching the patient with their needs. And as you said, no two patients are the same. And even the same age, demographics, and MRI appearances, you may have two totally different needs or desires from the patients who may have similar looking pathology. So really nice summary of your thought process. I appreciate that.

So your infographic acknowledged that these large and massive rotator cuff tears continue to be challenging for shoulder surgeons. Although there's varying definitions out there, could you just help define for us in your mind, what constitutes a large or a massive cuff tear, and then explain the specific challenges treating that particular subset of patients and why we're here discussing repair augmentation in the first place?

Patrick Denard:

Right. So massive is the easiest because it's five centimeters or greater, or complete two tendon if you use the Gerber definition. So complete supraspinatus. Supraspinatus technically would be a massive tear or complete supra. Subscap would be a massive tear if you're involving all of the tendon insertion. Large, we typically will use the Cofield definition where they categorize that as three to five centimeters. So anything we're talking about for this purpose is large and massive would essentially be three centimeters or greater, or complete two tendon tear.

Challenge with these obviously is healing because most of these tears are going to be chronic tears, and most of them are going to be associated with fatty filtration. You'll have the rare massive tear where somebody falls and has an acute rupture, and I think those fall into a different category, but most of these are going to be associated with retraction and fat infiltration due to the chronicity.

Chris Tucker:

So given that you mentioned the challenge is healing, and we know that there's varying levels of healing rates and functional outcomes associated with surgical repair of these large and massive tears, you referenced several surgical technique advances that have been developed to attempt to improve our outcomes. Can you just briefly review for us what tools we have at our disposal to enhance the surgical repair of these cuff tears in general, and then specifically, which work best for you for these large and massive tears?

Patrick Denard:

Yeah, I think you have to look at this from multiple vantage points. First of all, there's the patient themselves. And we don't talk about it as much, but is there anything we can do to optimize their biology out of the gate? One of the things I like to do, especially if it's a scheduled surgery, is make sure the patient is on vitamin D because there's some evidence that that may help.

Secondly, when I go in and do the surgery, then I have the technical factors that I can control. So what I will commonly do in a large and massive tear is use rip stop configurations. We described the load sharing rip stop technique, for instance years ago that we use for patients who have less tendon mobility, which are typically only amenable to a single repair, but we'll try to enhance the repair by using ripstop configuration.

And then you get to the biology aspect, and that's really where we've been using more of that in recent years. We've used PRP for years in large and massive tears, but the benefit of there is it's there, but it's on the marginal side. So it's not going to take somebody from a 10% chance of healing up to a 90% chance. It's really only going to make a small difference. So that's what we've moved into using dermal allograft augmentation to try to improve pullout strength and perhaps improve the biological environment.

And lastly, I think you need to be thinking about the rehab post-operatively because we know that these tears have a poorer chance of healing. So I think particularly with the large and massive terrors, it's important to be conservative on the rehab side. What I mean by that is typically these patients, for me, are going to be in a sling for six weeks with hand, wrist, and elbow motion only, and not beginning passive range motion until a six-week point. Particularly these large and massive tears, they do not get stiff per se because they're biological environment simply isn't what it is for a patient with a small tear. So you can get away with being more conservative in those cases.

Chris Tucker:

Yeah, that's interesting.

Speaking now specifically to the patch augmentation of rotator cuff repairs, can you review for us what biomechanical studies are showing in terms of how they're performing compared to the isolated repair without the augment, as well as any clinical trials that report patient outcome measures and how they're being used in vivo?

Patrick Denard:

Yeah, this is kind of interesting because this information has been available for quite some time. I mean, there's studies years ago out of the Mayo Clinic, which showed that dermal allograft augmentation improves pullout strength when you pass sutures through the dermal graft and then bring them out to the repair. And there's other studies that have supported that as well.

And then clinically, one of the classic studies was by Barber, and he looked at a series of rotator cuff tears and primarily large and massive tears, and found that healing rates were in about the 30 to 40% range without the use of augmentation. But with augmentation, they improved about the 80% range. And that study, I believe is almost 10 years old now, but it's only been in the last couple of years that people have really started to use dermal allograft augmentation more readily. And I think there's probably a couple of explanations for that.

One is that I think that SCR actually sort of raised the bar of what we would do arthroscopically, and that's pushed us to better levels whether or not SCR is beneficial or not. And there's a lot of debate there, but I think it certainly raised our standard.

And then secondly, the techniques have improved and become more easy to use dermal allograft augmentation. So for instance, with techniques such as Regeneten patch, which provided an easy way to do this onlay, and then other companies coming out with similar sort of techniques that allow you to apply this in onlay manner as it really facilitated the use of dermal allograft augmentation.

Chris Tucker:

So you referenced this earlier, and I'm glad you did because I want to discuss it now, but you talked about the rotator cuff healing index as a way to potentially identify those patients who had an increased risk of rotator cuff retear. Can you just explain for us now what the index is, how we calculate it, and then how you apply it clinically?

Patrick Denard:

Yeah, so I think in clinic, I think we're always trying to do this. We're trying to come up with these algorithms in our head and try to make a prediction if somebody's going to heal or not. And what the rotator cuff healing index is just it attempts to put this into a calculable form by creating a scoring system.

So Quan published in AJSM in 2019, looking at over 500 patients who underwent arthroscopic rotator cuff repair and looked at their healing postoperatively. They came up with a rotator cuff healing index, which assigned points to several factors that we know are associated with healing, but they really just put this into an actual index scoring system.

So for instance, the factors that they looked at, age over 70 gave a score of two points. AP tear size of 2.5 centimeters or greater was two points. And then retraction was up to four points based on the amount of retraction. Fatty infiltration, grade two and higher of the infraspinatus was three points. Bone marrow density, osteoporosis would be two points. And then high work was two points.

It sounds like a lot, but simply, if you look at people with large and massive tears, so they're going to be a three centimeter tear retraction, that's four points. They're typically going to have an AP tear size of over 2.5 centimeters, which gives you another two points for six. And then most of these are chronic. So in the chronic setting, they're going to have three points for fatty infiltration. So right there, there's nine points. So if you remember nothing else, if you have a large and massive tear with fatty infiltration infraspinatus over two points, your score is about nine.

And that's important because when you break down their healing percentages, you see that healing drops as the scores increase. Particularly, they talked about patients with less than four points having essentially over 90% chance of healing. But when it was over 10 points, it dropped down to about 14% of healing. When you substratify the scores, you really see a big drop-off at about seven, which is what we have done to try to give a guideline for people. So once you hit about seven, you drop off from about a 66% chance of healing to about a 33% chance of healing is a quick number.

So I think that is a time, to me, that is an opportunity to potentially modulate the healing chance of that patient, and do something else besides your standard repair techniques because that's where you've seen the biggest drop-off.

Others have argued that even if you have a 10 or 20% chance of healing, you should consider using augmentation techniques. But for me, you have to really look at the overall cost benefit here. And I think that's why I like looking at that area of the seven points and greater, is really considering use of advanced techniques such as dermal allograft augmentation.

Chris Tucker:

Yeah, that was a great explanation. Thanks. Questions always remain with respect to treatment of the rotator cuff. In your mind, what do you think is currently the most important unanswered question with respect to managing large or massive cuff tears? Or what do you see as the most important next step for advancement in this field?

Patrick Denard:

Yeah, that's a great question. I mean, putting an eye on one I think is really, really difficult because there's just really so many questions. Does SCR still have a role? For instance, we've seen a lot of studies come out recently, which showed poor healing rates with dermal allograft augmentation, but is it just perhaps that we need to be using tensor fascia lata as Mihata initially described?

There's been some interesting work in the biceps recently with regards to either using the biceps as augmentation or simply as Larry Fields describing, transposing the biceps slightly more posterior and leaving it intact distally.

But I think at the end of the day, for most of us, we're going to need algorithms like the rotator cuff healing index that are easier to use and perhaps even be automated. And that's where I would really see the biggest advancement, where you would have somebody come in with some simple questionnaires that they fill out and some demographic information, and their MRI would give you some automatic information to give them a patient-specific probability of healing with different techniques. And if we could do something like that, I think it would be a real huge advancement benefit to our patients.

Chris Tucker:

Yeah, that's a great thought. Pat, any other closing remarks before we close out the podcast?

Patrick Denard:

I think we covered a lot there, so no, just thanks for having me. And I hope people know they can reach out to me any time with questions.

Chris Tucker:

Appreciate that.

Patrick, I want to congratulate you again on your work, and thank you for sharing your time and your thoughts with all of us today.

Dr. Denard's infographic titled “Dermal Allograft Augmentation for Rotator Cuff Tears” is currently available in the November 2022 issue of the Arthroscopy Journal, which is available online at www.arthroscopyjournal.org. This concludes this edition of the Arthroscopy Journal podcast.

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