

Justin Arner:

Welcome everyone. I'm Dr. Justin Arner from the University of Pittsburgh Medical Center in Pittsburgh, Pennsylvania. Today, I have the pleasure of speaking with Dr. Chad Mather, hip preservation specialist at Duke University. Dr. Mather was the senior author of the paper titled, "Endoscopic Proximal Hamstring Repair is Safe and Efficacious with High Patient Satisfaction at a Minimum of 2-Year Follow-up," which is in press in the *Arthroscopy Journal*. Welcome Dr. Mather and thanks for joining me.

Chad Mather:

Well, thanks for having me.

Justin Arner:

Yeah, this is exciting and certainly something not that many people are experienced with. First of all, I'd like to congratulate you on what appears to be the biggest cohort of arthroscopic hamstring repairs in the literature, which is quite exciting. Can you tell us a little bit about how you became interested in endoscopic hamstring repair?

Chad Mather:

Absolutely. And I appreciate that very much and certainly want to thank my co-authors who studied this, tracked patients down and did all the work to collect this cohort. Appreciate that. Probably two things got me interested in it. One is that I'm the hip destination in our area. That's all that I do clinically. And so even though there are other people that do things like labral repairs and FAI, a lot of the hamstring tears, I'm the destination for those patients. And so I was seeing an increased number of them and so already had that as part of my practice. How I got the endoscopic part was largely from realizing, I was struggling with some of the open ones, where the glute is in a muscular person is hard to retract and you look down and the assistant's got the retractor on the nerve and I just thought, there's got to be a better way to do these, especially for those ones that are either partial thickness tears or that are like I said, living up by the ischium, under the glute. And so that's really, that's how I got started doing them that way.

Justin Arner:

That's interesting. It was more for ease and safety. That's great. Can you tell us a little bit about the summary of your article and your findings and what you guys found?

Chad Mather:

Yeah. The purpose of this study was, again, as the title indicates really to report on the initial finding safety satisfaction those types of basic things. Really to show that this is kind of a non-inferior to an open repair type of an approach. I always like to say with these that it's very similar to other tendon repairs too. It's not a completely new kind concept of course, it's similar to other arthroscopic repairs that we do. And so we wanted to show that generally we're seeing similar outcomes that was safe and efficacious. And I think that's what we found. I think some of the highlights are that largely patients did very well, the clinical outcomes were excellent across the cohort, low rates of retear or in complication.

Chad Mather:

I think it's not a comparative study of course. And this is how evidence is generated, you start with some level four, then comparative level three and so on. But anecdotally, I would say that there's no question

there's a lower infection rate versus an open repair. We continue to have had no infections in any of the endoscopic cohort. And I know that about two to three least in my open patients, so appears to be a lower infection rate and also appears to be a lower rate of injury to the posterior femoral cutaneous nerve relative to open repair. When I think about an endoscopic repair, as you mentioned there, I find it technically superior but also there are some benefits around lower nerve injury and infection relative to open repair that I've seen in my practice.

Justin Arner:

That's really interesting. The infection certainly makes sense. It's good to know the nerve injury thought process as well. You mentioned a little bit before the ones that are living up near the ischium under the glute are the kind of indications you use. Can you tell us a little bit about how you decide which you perform arthroscopically versus open, basically your indications for the arthroscopic technique?

Chad Mather:

Yeah. As most techniques, as you get more comfortable with it, it grows. The easiest ones to do this way are the refractory insertional tendinosis. And that's how I got started. It was patients that had had 10 years of pain. I know I had done one or two open and just thought, this is very dissatisfying technically. I don't feel like I'm doing as good a job as I otherwise could. And then began with that endoscopic technique. The first, gosh, probably five to 10 at least were all these refractory insertional tendinosis there. There's no scarring from a previous injury so they're much easier identify the sciatic nerve. And the tendon kind of sits there, you open it up and debride the degenerative tendon, tack it back down.

Chad Mather:

Those were certainly a large number of the ones that we do endoscopically but as I like to characterize that any work done around the ischium is better done endoscopically. I've evolved now to, if it is a full thickness but that tendon lives near the ischium or it sits under the glute, I think it's easier and better done endoscopically. And even in my retracted repairs, we do a hybrid approach where we'll start endoscopically, debride the scar around the ischium. When you're doing a retracted tear, ideally you're clearing that path so that the tendon can be brought back smoothly without any tethering to the ischium. We clear out that scar around the ischium endoscopically, place the anchors and then we'll go ahead and open it up, find it distally and repair it from there. Again for me, I use an endoscopic whenever I'm working around the ischium. And I'd say, when I do the whole thing endoscopically, that's probably within that two centimeter-ish area of retraction, I'll end up doing that. But like many things, you find as you do more, you find yourself more comfortable and then expanding those indications of course.

Justin Arner:

That's really interesting, the hybrid technique's exciting. And that's another question I had, what the transition was for arthroscopic versus open. You do both and I think might make a lot of us feel more comfortable if the arthroscopic portion isn't going as planned, you can still always open it.

Chad Mather:

Absolutely.

Justin Arner:

What circumstances are you doing the open repair basically, if it's retracted greater than two centimeters, kind of seeing how things go arthroscopically or any other pearls that way of which ones you're definitely doing open still?

Chad Mather:

Yep. Yeah. If the tendon sits down at or below the level of the glute, which you can see on an MRI really well, because you see the glute max coming across and you can see the tendon's relationship to that. If it's at that level or distal to that, I will at least again, do the hybrid approach where I will start, put the anchors in and then go ahead and open it up. I would say that most of the time for me, that's going to be in a chronic tear too. And so there's definitely a bigger operation but most of the time in an acute tear, we end up doing most of it endoscopically.

Justin Arner:

That's awesome. Can you tell us a bit about the technique itself and your patient setup and portal placement and any pearls? You have some pictures in your manuscript so I'd certainly would like to encourage the listeners to take a look at those as well.

Chad Mather:

Yeah. Well thank you. And at the specialty day last year, we did a talk. The invited talk was the title was, Is It Time to Add This to My Practice? And so I appreciated that framing to think about that in that way. And I think there are a lot of similarities to other tendon repairs. And so making that jump is not as daunting as it may initially seem. But there are several pearls that I've identified and developed along the way that can be helpful. With the setup, we use the prone position. I a bit of bend in at the waist and then flex the knee up about at least 45 degrees, that helps to loosen the sciatic nerve, of course, as much as the hamstring.

And then with the portal placement, I evolved to using kind of an almost a diamond shaped arrangement where you've got a couple, in the central area that would be your proximal, distal portals. Those are the first two to start with. And then we'll add one laterally. And then often one a bit medial too, for suture management and passing and such. The most risky, the dangerous portal of the four is the far lateral one. That's the one that comes into the sciatic nerve. I'm always really over flattening my hand to miss that way so that you're not hitting the nerve. The two that I start with are always those two central ones. And so they kind of you will sit over top of the hamstring and the nerve and I'll start with the distal one and really all movements in the first part of the case are in line with the nerve.

Just with some gentle blunt dissection, very careful. And then we'll place the proximal portal under direct visualization. Again, continuing with some blunt dissection until the nerve is identified. I don't have any level of comfort until I know where that nerve is. And it has a variable course. Sometimes it hugs the anterior aspect of the ischium, almost sits anterior to it. That would be in your patient with ischiofemoral impingement. And so you always beware it can be sitting there. If you abduct the leg a little bit, that helps open that space up. And a lot of times fortunately, the nerve sits deep or anterior and lateral. It's not always right in your view, it's usually pretty well out of the way.

I like to use what I call a poor man's nerve monitoring, if you will and have someone hold the foot while we're doing all this. I use a shower curtain drape so that we can see the foot very well. It can be held very easily. And then anytime we get any movement, we're of course, we're very aware of that during this part of the case. I find that the nerve, it is very sensitive. We're going to feel that before in any danger at all. And so again, the first part, get just blunt dissection, identify the nerve. You can almost always see the posterior femoral cutaneous coming off. We can kind of retract that as well.

The next part is to put that third portal in and at that point, that becomes the portal to retract the nerve. And almost more than that, it's just to keep the nerve from getting into your working area. You don't want suctioning or other factors going to pull that in. And so it really doesn't pull on it so much, it just kind of holds it away there. And so we'll use a switching stick and that medial or lateral portal to do that while we open up the tendon for repair.

For the partial thickness ones, this is probably I think the best evolution of the technique because I used to, probably early on I probably I would say, less comfortable and I probably didn't get all the way down to the semimembranosus but I can tell you now that most of these insertional tears, that's the more severely torn of the two tendons and so used to kind of come from the top down. And it really wasn't I wouldn't say it wasn't as anatomically accurate to open up the tendon there, you would go kind of through the muscle bit and while those patients are in this cohort, they did really well. It wasn't as elegant as thought it should be.

In studying the anatomy, you notice as you come distal just off the ischium, there's a very obvious interval between the conjoint and the semimembranosus. There's a clear fatty interval there. I will come down to that point, identify that fatty interval and then work up to the ischium and you can very clearly see the separation between the two tendons. And so I'll start distal and open that up in that natural anatomic cleft and that creates a great area to repair. You can kind of retract the semimembranosus a bit down toward the nerve and then I'll put a suture in the conjoint tendon, hold that up. Then you've got nice access to the ischium to do your tendon repair from there. At that point, most of the repairing things are everyone's familiar with the typical tendon repair techniques.

I've tried a few constructs over time for these partial thickness ones but I would say I'm back to largely what's in the article and how we started. Because I thought, I had the custom, maybe you could use a central lateral row type anchor, a central anchor to bring those down but I think they look best and it feels best if I usually use about four double or triple loaded anchors and use a series of mattress sutures, both in the tendons individually and that across the interval. And to me that that does create a repair that looks like the one that we published that technique that is in arthroscopy techniques and gone back to that and very happy with that from a construct standpoint.

For some of the acute minimally retracted tears, those will often tear almost in the center of the tendon. And so there'll be a little bit of proximal tendon usually. And then those patients I'll often use a classic suture bridge technique. We'll put some distal anchors in past that, bring that over to a lateral row type anchor and then I'll even use some of the stitches that are remaining in that anchor too. Sew that into the residual proximal tendon and it can be very satisfying technically to do it that way. And had some nice repairs doing it that way.

I guess the only other pearl I would share is that there's an anatomic fibrous band that runs on the anterior proximal aspect of the ischium and the sciatic nerve sits right below that. And oftentimes that needs to be gently released so that the nerve can be retracted out of the way and you can fully access the semimembranosus. And that's probably the part of the case that's the most tenuous, in addition of course, to finding the nerve initially but we want to be very careful. I usually use a lot of blunt dissection. I use a little bit of the shaver but way away from the nerve and then use the radio frequency a bit to clean that up. Again, whatever it close to the nerve, I tend to favor general blunt dissection to free it up as needed.

Justin Arner:

That's awesome. Do you release that fascial band typically if you would've done it in an open fashion previously? Or is that less important?

Chad Mather:

I don't think I do with the open technique. I didn't even know was there doing them open. It's a subtle small band and I think that's part of the value of the endoscopic approach is it gives you so much greater level of detail. I have no doubt I'm doing a better repair actually. No question in my mind, it's a better repair. And I think the comparison to the arthroscopic rotator cuff repairs, it's virtually identical. The same reasons, justification for why we converted to an arthroscopic rotator cuff repairs, it's the same thing for a hamstring repair.

Justin Arner:

That's great. I love the explanation of the anatomy, finding it distally is great. Whenever you're doing the suture bridge technique for the larger tears, are you using a similar type anchor that you would use in a rotator cuff and like you mentioned, kind of crossing them? Is it the same anchor you typically use in a rotator cuff?

Chad Mather:

Yep, exactly right. I think I'll probably use more of the sutures coming out of that lateral row anchor. Sometimes I'll put them in the semimembranosus on the anterior side. Like I said, I'll kind of tie in some of the proximal tendon. I would say that otherwise it's pretty much identical to what you do for a cuff.

Justin Arner:

That's great. Can you tell us how you basically became comfortable with this? Do you recommend, and as you mentioned with specialty day, would you recommend getting into the lab and starting to scope a few of these? Or how would you tell some of us folks that haven't done it arthroscopically before to get comfortable before we do our first one?

Chad Mather:

Yeah. I think that certainly getting into the lab is helpful to understand the relationships to the anatomy, what movements are safe and so on. I do think it is intimidating without question but I actually think it's easier than you think. I remember the first one I did, I found the tendon almost immediately and I thought, this shouldn't be this easy. And I kept looking around thinking wait, this can't be this easy. And it is. It's actually fairly easy. It's one of those techniques, just like doing a psoas release for a total hip, which I would still tell the fellows that this is technically an easy, simple procedure but you should be scared because you're close to bad things.

And the same thing here, it's actually technically not that difficult but always on high alert to make sure I don't get too comfortable if you will, doing it. I would tell you that, especially if you're an arthroscopist, you're going to be able to do a better job than doing an open. It is for partial thickness tears and the tears that are proximally, unquestionably safer too. I think the nerve is far safer when you do it that way. The biggest thing I would say is that it's not as hard as you think it's going to be. It's easier to make that transition than you think. And then probably I bet, one or two times in the lab is probably adequate. And like you said earlier, if you're not comfortable with it, just open it up. If you're not comfortable finding the nerve, just go ahead and open it up and do it open and you really don't lose anything that way.

Justin Arner:

That definitely would make you more comfortable starting out. That's right. Can you tell us, you said you're definitely getting a better repair. Anecdotally, have you seen differences you think in maybe the

open ones you did years ago versus the arthroscopic folks in terms of pain postoperatively, early and long term recovery?

Chad Mather:

Yeah. For those refractory tendinosis, those are the ones that there's I think the biggest difference between the open and arthroscopic. And I only did a couple open of this before I developed the endoscopic technique but anecdotally, no question that the endoscopic patients doing better than those early patients were doing. There's no doubt about that. For the others, I think it's probably, I don't know that other than the complication aspect, I don't know there's any difference from the open repairs but again, I'm much more comfortable with the nerve and protecting that. And so I think by having that zoomed in arthroscopic view, you're much better able to keep the sutures from being tangled and have more comprehensive placement of the anchors across the footprint. Again, I think just having a better, tighter repairs.

Justin Arner:

That's great. Can you tell us a little bit about your postoperative protocol? Do you use braces? And any of details regarding how you treat these people postoperatively?

Chad Mather:

Yeah. Yeah. That's evolved a bit. I used to flex the knee more and realized that when you're walking around, even at toe touch weight bearing or with an EFLEX, inevitably you're going to contract the hamstring. Even if conceptually the brace is holding it, it's really not. It's putting the hamstring in a position where it's activating. I've gone away from using a brace while they're ambulating and just use six weeks of partial weight bearing with crutches. I do use a brace, usually locked in about 50 degrees at night while they're sleeping. I do lock them in a bit of a flexion to protect it while they're sleeping. And then for open repairs, it's really not different. I don't want to have a lot of tension on it. If I think there's a lot of tension on the repair, then I'm probably going to use a graft. And I would say that most of the bigger tears that we're doing are chronic and so they are a bit retracted and I think necessitate a graft to really be safe with the repair and I'll use the same bracing technique for approach for those too.

Justin Arner:

A little off track, but could you tell us a little bit about what graft you typically use or any tricks that way? I know I've seen people use Achilles, with leaving some bone. What is your preferred grafting technique if you're going to use allograft?

Chad Mather:

Yep. I do use the Achilles. I don't keep the bone block on, although I think that's intriguing and I don't have any issues with it. I think that's an interesting way to approach it. The other thing I do over time is I'll again, if it's a chronic tear and it's all scarred in I'll have one of my hand surgeon partners help me with the nerve release. I didn't have any complications doing it myself but just being a proponent of specialization, it's not something I do day to day is release peripheral nerves from scar. The other thing I think it does is it allows me to focus more on the other hard parts of the case like getting a great repair and the grafts and all that.

And so you add that to a sciatic nerve release and it's a long, stressful procedure and I think I do a better job by handing that off to my partner to do. I think it's safer for the patient. And at the end of the day, that's how I would want that done. If it was me, I would want a hand surgeon to free up my static nerve,

especially in a patient who's got of nerve symptoms because they're typically extremely tethered and we'll need a pretty comprehensive neurolysis.

Justin Arner:

That's always a good way to think about it, what would you want for yourself? It's a great plan. Can you tell us, back up a little bit about the chronic tendinosis, like we were talking about before, what do you do before you decide surgeries a good option regarding injections? What type of injections? Therapy? Basically, when do you pull the trigger on those tendinosis or partial tears?

Chad Mather:

Yeah, absolutely. Well, obviously nonoperative treatment is the workhorse for those and they're all not created equally. You've got your war true tendinoses and then you've got your almost a full thickness tear. One of my talks that got an MR that I'll turn 90 degrees and looks like a rotator cuff. Looks like a tuberosity. And you look at it that way, you realize that that thing is a few fibers away from being a full thickness tear. And so in those patients, I'm less likely to use something like PRP but in a more classic tendinosis, especially in a younger patient, I'll almost always try PRP. And it really almost won't do an endoscopic debridement repair unless we try that. I can't say I've had a lot of success with PRP.

I know that John O'Donnell and his team published a great randomized trial PRP for gluteal tendinopathy, so conceptually it should translate but the current state of evidence, which is limited for PRP in hamstring tendinosis does not suggest the same outcome. I'll try for those true tendinosis cases. But again, if you look close, you notice that a lot of these are really pretty high grade partial thickness tears and for those I'll still do a steroid injection really to facilitate rehab, talk to them a lot about the functional pathology here. Virtually all these patients are hamstring dominant in their extension patterns. And so we'll work on activating the glute and getting the glute max to be doing its part of the work. And I tell them, we need to do that either way. If they have surgery and they don't fix that hamstring dominant extension pattern, they're going to often have some pain. We work on that early and if that's enough, great. And if not, of course, we've got the endoscopic approach. But definitely I would never move directly to endoscopic repair for any of these partial thickness ones.

Justin Arner:

That's a great review. Thanks for that. And how about if we go to the next level. I feel like some of the more difficult decision making are acute hamstring ruptures, typically we like to do them fairly quickly. Can you tell us a little bit about how you decide is it the two centimeters? A lot of them, least the people I see are a little bit older, active. They all want to know, do you have to have surgery? The discussion with hamstring syndrome. Can you tell us a little bit about how you discuss operative versus nonoperative for those acute full thickness tears and how you guys decide together on surgery versus no surgery?

Chad Mather:

That's a fantastic question. And another area that's where my thinking has evolved over time. I always like to say that the number one indication for an acute repair is to prevent a late repair because a late repair is much more morbid and a bit higher risk and so on. But many patients as studies have shown for years, can do very well with nonoperative treatment. I think if you truly can get to them in the early period and I would say the early period is definitely less than two weeks. I've operated on people all through that spectrum and by two weeks on, they're already starting to heal in and it's already starting

to become like a chronic tear. And so I don't see too many people in that window. Usually I've seen it no earlier than three weeks, maybe four weeks. Couldn't get them to the OR until maybe four weeks.

I've noticed that it's already pretty well healed in so I'll tell them even if they really want to have surgery, I'll say, "You know what? Surgery tomorrow isn't going to be any different than surgery in two months from now and let's give it a try." Because when they're in that acute phase, they just can't imagine that this is going to get better. But it does, it does. And I would say the vast majority patients when they come back in two months later, they're largely doing fine and then elect not to have a repair. And I agree with you. I see a lot of the older patients. I always underscore that the hamstring has backup, if you will, from the glutes and the gastrocs and I show them that they can still bend their knee and so on. And they still have some strength there.

I think we know that for people who maybe do a lot of bending work because the hamstring is that primary hip extensor, they might have limitations or of course in explosive acceleration type sports sets, that are active in that and we favor repairing it. But I think if you get to it within a week or 10 days and it's acute, I think probably makes sense to fix it, especially if they're active. But other than that, I give them a trial and I think most of them end up staying with the nonoperative approach.

Justin Arner:

That's great to know. Everyone I feel like is a little bit different in that sense. A month, six weeks and it's good to know that a lot of these probably fairly active people are still doing well and elect not to have surgery. It's great insight. I think, unfortunately we're running out of time. I could keep asking you questions about the posterior hip, I think all day long. Thanks for are sharing your results and insights and all your pearls today with us. We really appreciate your time.

Chad Mather:

It was my pleasure. Thanks for the invitation. Hopefully it was helpful. And of course encourage anybody to reach out if they have questions or come visit when we do one of these. I've had a few people visit and they say, "That is easier than I thought it was." I think you'll help a lot of people by adding this to your practice. Think there's a lot more of these out there than we realize. So many of my patients are referrals from other patients and where a doctor will refer one and then there's three or four more that are related. I think developing this approach in your practice, it'll help a lot of people and it's probably easier than you realize.

Justin Arner:

It's certainly less invasive procedures or something patients want and we do too. Thanks for that.

Justin Arner:

Dr. Mather's article entitled "Endoscopic Proximal Hamstring Repair is Safe and Efficacious with High Patient Satisfaction at a Minimum 2-year Follow-up" is in press in the *Arthroscopy Journal* and is available online at arthroscopyjournal.org. Thanks for joining us.

Justin Arner:

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