

**ARTHROSCOPIC ROTATOR CUFF SURGERY
TULANE MEDICAL CENTER
NEW ORLEANS, LA
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FELIX SAVOIE III, MD: Hi, welcome this evening from beautiful New Orleans, Louisiana, Tulane University Medical Center. We're here for a live webcast of rotator cuff repair surgery. I'd like to welcome all of you from all around the world to our city and to our operating room. We're going to be talking about rotator cuff repair: specific techniques and some new things that we're doing to try to improve the recovery of our patients and make it easier for all of us to fix the rotator cuff during surgery. I'd like to send a special thank you to DePuy Mitek for sponsoring this webcast, to Dr. Scott Cohen, Dr. Ben Sacks, and Dr. Raoul Rodriguez, Dr. Lynch, all of Tulane University, Tulane Medical Center, and especially the Tulane Department of Orthopedics. As we said, we're going to talk about rotator cuff repair surgery, and so if we go to our first slide to talk about the case, we'll be talking about a 15-year-old -- excuse me, a 58-year-old female. She's had shoulder pain for about a year off and on. She started seeking medical attention after it had been bothering her for about three months. She had two cortisone injections, she had multiple courses of different medication, and was placed in physical therapy for about three months. Despite this excellent care, her shoulder continued to worsen and she was sent in to us for an evaluation. On her initial evaluation with us, she had a passive range of motion of about 80% of normal. Main limitation was an internal rotation, which was significant. Her active range of motion was only about 50%. With hiking her shoulder, she could get it up to flexion of about 90%, abduction of about 80%. She had a positive supraspinatus isolation test. That's done with the thumb up at 90% in the plane of the scapula. A positive whipple test and a positive infraspinatus stress test both at 30 and 60 degrees as well as 90 degrees. Her MRI scan which was brought in showed a full thickness rotator cuff tear, some inflammation in the biceps, and what appeared to be an impingement as well as some AC arthritis and edema. At that point, her options were basically live with it or have it repaired, and she was indicated for surgical intervention. What we'll do is take you now to our operating room and show you our standard setup for surgical intervention of the shoulder.

So here we are, it's a left shoulder. You can see we've marked the acromion, the clavicle. The circle represents the coracoid. We set up portals posteriorly and anteriorly and then our lateral portal is in line with the anterior margin of the acromion going straight down the arm, not cheating backwards. We check the shoulder, shift it back and forth, and our posterior portal is placed in the rafay (sp?) of the infraspinatus at the three-to-nine o'clock position. It should be a straight shot into the joint, relatively easy to see. We'll then bring our arthroscope in to perform a diagnostic glenohumeral arthroscopy. We've always

performed an exam under anesthesia prior to this. I use gravity in-flow, I don't use a pump, and have not found that to be a problem in terms of bleeding. We usually run hypotensive anesthesia. Our initial view begins with the biceps and then the rotator cuff. You can see the air bubbles. We've just put the scope in the shoulder. Looking down the front, no real labral pathology, just some minor fraying. The head seems to be sitting down. You can see the inflammation in the capsule, though, from the mild capsulitis. Here's the biceps. We look up and we can see a defect in the rotator cuff. And as you notice, it's kind of a split tear. The small labral tear is irrelevant. We then take the scope out of the joint, put it in the bursa. As you can see, this is an impingement-mediated tear. There's a large subacromial spur, and obviously from the fraying on the underside of the spur and on the top of the rotator cuff, you can see where this has been a problem. We'll set up our lateral portal about three centimeters down and bring the shaver in. Instead of starting our shaving on top of the cuff, though, we start down the arm and try to elevate the deltoid. Most patients have lateral arm pain, and that's usually a result of this inflammatory bursitis in the subdeltoid area. If you'll notice, the shaver is pointing upward to prevent any inadvertent injury to the axillary nerve, but this lets us clean up under the deltoid. It'll pop up, give us a better view, without damaging the rotator cuff. Additionally, as you see here, this spot of posterior lateral bursitis-- subdeltoid bursitis is usually what causes this lateral arm pain that this patient and most patients with rotator cuffs are complaining of. I used to think that this was referred pain, but it's actually this area of subdeltoid bursitis that seems to cause these symptoms. So the lateral bursa we usually think of as being pathologic, and we'll excise most of it and gives us better access to the rotator cuff. We'll now come back on top of the cuff, find our CA ligament, acromion, and come down the CA ligament until we can find the coracoid. Here's the front edge of the acromion, obviously a spur. We're coming down and getting inside the coracoid process, and as we drive down, there are two things of interest. We want to know what the coracoid looks like in relation to the conjoined tendon and we want to see if there's a contracture of the coracohumeral ligament. So here we are on the coracoid itself. You can see the bony part where the CA ligament is coming down to insert on it, and that's the coracohumeral ligament. In every rotator cuff repair we do arthroscopically, we release that coracohumeral ligament. Dr. Charles Neer, who we all know, made a very big point that the coracohumeral ligament is a cause of lost motion: this patient had a loss of internal rotation. We also want to look at the coracoid for a spur. And if you look carefully at it, you'll see that it hooks backwards, or posteriorly, towards the shaver and it's certainly not confluent with the conjoined tendon.

So we'll move medially, we'll take this coracohumeral ligament down completely so that we can have an easier time mobilizing the supraspinatus. I think releases are very important. We always want to make a tension-free repair of the rotator cuff. So first step in that is to release this coracohumeral ligament. You can do this with a cautery, you can do it with a shaver, but it's basically coming along to the base of the coracoid and releasing all of these soft-tissue connections. You can see how this gives you a nice view of the posterior aspect of the coracoid. There's usually no blood vessels here or very minimal ones that would interfere with your visualization. Now, once that ligament is gone, you can really take a careful look at your coracoid and look for posterior coracoid spurs. This patient had a little bit of fraying of the subscapularis, and as you look here,

you can see the coracoid is moving posteriorly and is certainly projecting backwards from the conjoined tendon to your left. And so if we trim down this small spur, that'll help us in terms of motion, of external rotation, and elim-- and limit this impingement on internal rotation from the subcoracoid area. So we'll trim this back until it's confluent with the conjoined tendon. So in my way of thinking, coracoid impingement is related to a posterior projection of the tip of the coracoid that extends posteriorly from the conjoined tendon, and you can see the two parts of them taken off and us smoothing this down. It's an integral part, it's something that you should look at. I would estimate that somewhere between 1% and 2% of the time we take down this coracoid spur and it's almost always related to an impingement-type process, especially with internal rotation, with the arm in abduction, and then in trying to obtain full external rotation with the arm at the side. So here's one more strand of bursa. You can see there's obviously inflammation there. There's the conjoined tendon, and we're trying to make sure this is nice and flat. And we're pretty pleased with this. We have plenty of space. We'll then move medially and follow the medial aspect of the coracoacromial ligament upward to the AC joint. Now, this patient has AC symptoms, and what we would like to do here is get in the plane above the bursa but below the bone. This is important in a number of ways. One, it minimizes your bleeding; there's always a venous plexus beneath the AC joint, and if we can stay above that, that'll help us. Additionally, as we come posteriorly, we'd like to preserve this medial bursa. This is not the pathologic part, this is actually where the blood supply comes in to that cup. So if we can get above that bursa and let it drop down onto the cuff, we can preserve that and improve our blood supply to the rotator cuff and hopefully improve our rate of healing. And so you see it's coming over the bursa and then coming around the cuff so we can really define what we're doing. I think technically we're all very good at rotator cuff repair now, and so a lot of it is going to be about biology as we get through this. Once we complete our release, we'll come back and look at our cuff. I am not a big believer in debriding away a lot of the cuff. I won't bite or displace any of the avascular area. We'll use that as a part of our repair. I do think it's very important to clean off the tuberosity. We have to get blood cells coming up from that greater tuberosity. There's some new data from Russ Warner and the guys at HSS that perhaps some healing does come from the tuberosity if you punch holes in it. And Steve Snyder has talked about his little microfracture-type technique where he pops in there, and we want to do a little bit of all of that. We'll come be-- we'll come beneath the cuff and release that as well. I would like to emphasize that if anybody has questions, please e-mail them in. We can certainly stop at any point in time and take questions. As we've come from the posterior aspect, we move the scope laterally. You can see the tuberosity itself coming across here, and we're going to create a good healing bed for that rotator cuff to heal to. It's nice to have a trough right off the articular cartilage. We don't usually move into the cartilage itself, but we'll come across and make a nice bed for our medial row if we're going to do a double-row rotator cuff repair. You can see the damage in the cuff below. We'll then come up and look at the acromion. I think most patients in my practice have impingement-mediated tears. You can see the hook on the front of the acromion. Certainly if they don't need it, we don't do anything. I don't take a lot of the acromion from the side; I come straight from the back. And the idea is to recess the anterior margin of the acromion until it's posterior to the anterior margin of the clavicle as visualized from this lateral portal.

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What that tells you that in some patients it may be no debridement at all. In others, it may take two centimeters of bone. But it gives us consistent guidelines as to how much acromion to take. So as we swing back and forth, you can see this is just nice and easy, cutting-block technique as described by Dick Caspari. And we keep going back and forth, smoothing down the acromion until we recess that anterior margin. We try to preserve as much of the coracoacromial ligament as we can so that there's no problem in terms of anterior/superior escape if perhaps the rotator cuff doesn't heal. So here we are swinging back and forth. We'll back up, make sure this is nice and smooth and flat. And you take it back until you have a nice good surface. In this patient, there was also a lateral spur kind of posterior laterally, so we came back along the lateral edge of the acromion and took that spur down. Remember that most impingement occurs at the anterior lateral corner of the acromion and you really have to define that lateral margin and the anterior margin to do an anatomically adequate acromioplasty if you and your patient feel that it's indicated in that case. So we do take a little bit of time to swing back and forth. We usually, by taking the ligament down with bone, don't run into bleeding from that coracoacromial arch. Sometimes if our fluid's running a little bit low or if you're having some issues, we may get a little bit of increased flow, but we'll turn our flow down so that we don't have too much swelling and tolerate a little bit of that just in case. You see our in-flow here where we just make sure it's in a good spot, we have good visualization. And in the distance, you can see the clavicle. Normally, you're going to end up with about one centimeter of visual deltoid tendon, as you see here, and a nice, flat acromion. Again, at any point in time, please feel free to e-mail in questions. We'll be glad to stop for a minute and take questions. You can see how this is nice and flat. We keep working on this, and I think, along with the releases, an adequate decompression and if necessary an excision of distal clavicle is an important part of the repair. It also gives you room to operate. So it's a little bit easier and maybe increases some healing factors.

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So it's very important. We talked about releasing the rotator cuff. We're here working on the AC joint. You have to have a tension-free repair in the rotator cuff. And so that may include releasing the suprascapular nerve, which we would do after this if necessary. It may include releasing adhesions under the AC joint. And so we're coming in from the front here. The scope is still lateral. And the arthroscope -- excuse me, and the instrument is coming in anteriorly. We visualize from the back when we do the coracohumeral ligament release and coracoid debridement, and we operate from the lateral portal to do that. If your lateral portal is established correctly and your posterior portal is used for visualization, it's easy to see. There's a question here about radiofrequency and thermal devices. We don't use those. We really don't feel that those are necessary. As you can see, we see very well. We want to preserve blood flow and blood supply. So it's not been a problem for us in bleeding about the shoulder. There's another question about releases. We always release the coracohumeral ligament. If there's any stiffness to the shoulder, we'll do a 360-degree capsule release within the glenohumeral joint before we ever start the procedure. Always the coracohumeral ligament, we always release the underside of the cuff tendons. In other words, release the capsule from the underside of the cuff. And we always release any adhesions above the bursa on the top side of the cuff. But we always preserve that medial bursa from a blood-supply standpoint. The other question is:

would this procedure be the same for a professional athlete? I think you operate on patients and anatomy. God makes a shoulder a certain way, and we always try to put it back the way that that patient was made. So every cuff repair is unique. I've probably done 20-, 25,000 rotator cuff repairs in my career, and I can tell you that no one of them is the same as another. So every one is unique, but if it's a professional athlete, if it's a routine worker, you have to repair the rotator cuff adequate for that patient. So, so far, as what we've shown here would not be any different for a professional, nonprofessional, an athlete, or a regular nonathletic person. So if we can go back to the surgical video...

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So here we are at the AC joint. Now, I will tell you that our indications for removing the distal clavicle are preoperative AC symptoms and MRI evidence that the AC joint's a problem. We'll often put an injection in it. We do not routinely take the distal clavicle, but a lot of my patients are older, as this lady is, and they may have some AC symptoms. If there are no symptoms at the AC joint, we leave it alone in its entirety. So they have to have preoperative symptoms related specifically to the AC joint, and you can see the arthritis here. Now, it's very important if you do do a distal clavicle excision that you preserve the capsule of the AC joint, especially superiorly and posteriorly. You have to take at least five millimeters of bone. You usually try to take eight millimeters of bone to ten millimeters of bone between the two sides of the joint. Here we are working a little bit on the clavicular facet of the acromion to make sure we have good clearance and there's no further evidence of AC impingement. We can then go back to addressing the rotator cuff. It's important that the humeral head be displaced downward so there's no tension on the repair. Here you see some adhesions posteriorly. We try to get these out when we did our first circuit, but you can see the deltoid to the right, the humeral head below, our scope is lateral, our shaver is coming in from posterior. And we have to have good visualization of this entire rotator cuff. So here we are, and if you look at this rotator cuff, it's a U-type shaped tear, both supraspinatus and infraspinatus are displaced medially and posteriorly, so it's a good indication for a double-row rotator cuff repair in this patient. So we're going to set up a superior portal with which to insert an anchor. This comes off the anterior lateral corner of the acromion, and obviously a cranioplasty gives you more access. So we're going to put this anteriorly on the tuberosity. Again, cuff's displaced medially and posteriorly, so we have to repair them for the most part anterior laterally. That's the movement we have to achieve. So we're going to bring our awl in, and we're very fortunate in this case to use one of the new Mitek Healix anchors. This has cancellous threading, as you see, on its most distal part, and cortical threading on the top part. So we get a double bite. We get a cancellous bite deeply, the anchor expands a little bit, and we'll stop it right at the edge of the cortex so that we get a cortical bite as well. So it's doubly strong in terms of its holding power; much better than anything else we've ever used.

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I'm a big believer in absorbable anchors. This is currently a peak anchor, but it's coming out in an osteo-conductive version, which we've tested and we think's going to be very good. We'll then use a 60-degree retriever to come in from our posterior portal. You can move it medially if you need to. It's extremely critical that this device go through the undersurface part of the cuff medial to any extent of tearing. So you see, we're coming through infraspinatus here medial to that undersurface split, and we'll pull these stitches

one at a time through the cuff and out this back portal. Nice and easy, taking our time. So we did one. We'll come a little bit more posterior and grab the second one. All medial stitches need to be mattress sutured, so we've got to pull that edge back to its normal position just off the articular rim of the humeral head. So here's our two stitches, again, going through both layers of this rotator cuff. We'll come right back in through the posterior portal and do a third stitch. This one comes through supraspinatus. We have to go around our infraspinatus stitches and we'll grab the more posterior of the two sutures. The nice thing about this is you can pretty much do anything with it. You don't want to grab the two, that's an error on my part, and so we'll kind of shift this over just a little bit so we can just take the one and the more posterior. We then have to get our last stitch. So we can still come in from the back and grab this suture. Now we basically have two mattress sutures, two of those are through the supraspinatus and two through the infraspinatus. We'll then bring in a superior cannula and retrieve these sutures one at a time to make sure that they don't tangle. And we'll start in the back and bring them forward. You can do a handoff technique where you bring the sutures to yourself using just a closed-ended knot pusher. And then you can grab them with the crochet hook, you can grab them with a grasper so that you can pull these out. It's very important to watch your anchor and make sure you don't accidentally offload your sutures. If you pull the wrong limb and you see it moving the anchor, you stop. So we pull our first two sutures out. We're going to tie a modified rotor knot to tie this down. I think it's important to learn at least one really good sliding, self-locking knot. I use the modified rotor. It works very well for me. It lets me tie much tighter than I ever could sliding half hitches or using any of the knot-assisting devices. So I think that gives us a good attachment and it brings our undersurface part of the cuff back to that trough. And as we tie this first one, it should really close off the joint. As you see here, we can no longer look into the joint. So this was a three-centimeter tear in terms of displacement by the time we finished debriding it, and it very easily comes in and attaches right to the tuberosity. We'll then retrieve our -- we'll cut this -- one of the limbs of this one and preserve the one limb for a suture bridge-type technique. Then we'll take that cannula out and put it back in so that that suture stays outside of the cannula and doesn't interfere with our next suture tying. So we're coming in right from the top, that portal's right off the acromion. The same handoff technique to make it easier. You certainly don't have to hand off, but it just saves you a little bit of trouble. And then we'll tie this one down, and that should completely close our joint off. Our medial row should be fixed, solid, and there should not be a way for us to look back into the glenohumeral joint if we've done an adequate repair. I usually find that one medial anchor is enough for most double-row techniques. I have no problem if you need two, but usually that would be -- in my hands -- would be eight sutures coming across, and as you see here, that's tied down quite nicely and we cannot get back into the joint. But we have our entire lateral greater tuberosity to work with. So we'll move our scope to the back now and come in with a lateral cannula. We have our other two stitches out the top, and now we use the EXPRESSEW II to place sutures through our lateral edge. We can clean up some more, make sure we have good access down the humerus. As you see here, some of that bursa is swelling from our surgical procedure, so we want to minimize that. We've already taken most of it out to give us a better visualization, but again, this is the lateral bursa. It's usually pathologic. It's not a part of the blood supply that we know of, and so that gives us better access in. Now we see our tear from the posterior portal.

Certainly the medial part and the muscle/tendon junction is back where it's supposed to be. We'll clean up a little bit more so we can see better, and there you see our two stitches coming out the top. Now we can assess this lateral edge of the cuff. We've looked at it from laterally. We know we have kind of a split tear in it, and it'd be nice to get a mattress stitch to turn that edge down to the lateral cortex. Pascal Boileau has published a series using PDS sutures that really pulled it down and around the corner; had excellent results. Of course, he's a wonderful surgeon, he does great work, but if we can add this in as a part of this and incorporate others' knowledge into our rotator cuff repairs, I think we'd do a little bit better. And so here we are cleaning this off. We'll now bring our EXPRESSEW II in, and that lets us pass a stitch in the posterior aspect. Here we are, we're coming in. And as we deploy this device, we'll pass our one limb of our suture, which is a number two ORTHOCORD suture into the joint, and there you see the suture coming in. And this is a very nice grasper. It lets us grasp at the tip and we can pull this suture up and hold it in place as you see here while we remove the EXPRESSEW. We'll pull one limb of that suture up and out that same cannula, and then we'll come back with the other end of the suture and place it through the rotator cuff lateral edge more anterior to where we were working.

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So here's the EXPRESSEW II. We're going to bite this anteriorly and make sure we go around and close that split. This is all lateral to our previous repair because the medial row is so tightly attached that there's no way to get past it. And I do with this technique a so-called rip-stop stitch. You can do a convergent stitch, but for this, this is going to come in, this'll leave us a horizontal mattress stitch through the lateral edge of the rotator cuff. Now, all of these sutures are now coming out that superior cannula, so we have our two sutures that come from our lateral mattress stitch and we have the two from the previous medial row that we put in. We'll then pull the two sutures that are in the lateral cuff out first and lay them to the front. We'll bring out the sutures one at a time from our medial row repair and pull those out our lateral cannula as well. And then we're going to deploy our second row or our lateral row around the corner. And we're going to use a Versalock anchor in order to do that, because that allows us to place four sutures through this anchor. So here we are with our back stitches and our front stitches. We bring the anchor into play, we pass the two stitches from our mattress through one part of it, the two stitches from our medial row through the other part, and deploy those through the anchor and make sure they come through just like we want them to. So this is a one-step thing for our lateral row and does not involve any knot tying. We'll kind of tension the sutures a little bit and make sure there's no -- no kinks, no problems. You can see we just hooked it around the stop cap for just a second and we've got that freed up. And this'll come right down through a seven-millimeter cannula and it will hit the lateral cortex. So as we come down, we'll look at the top of our cuff, we'll bring that down and around the corner of the humerus so we can get a good cortical bite. We look at our sutures, we put some tension on them, and then we'll tap the anchor into position, making sure we're in the cortex, happy that we're on cortical bone. We have a direct view of it. Move the cannula down a little bit so we can really see where we're going, start it in, try to get a gauge of how tight and how stiff the bone is. We'd like to be just right behind our biceps tendon, because that's some of the best bone down the humerus. So as we cap this into position, you can see where the normal stopping part will be. We can pull some tension

on our sutures. And here is the anchor going all the way in. The other nice feature of this anchor is once we get to this point, we have our suture bridge coming over the top, but we can take our two sutures that are in our lateral row and tension them. So we add our low gun to the top, as you see here, and now we'll take our sutures that are just the lateral mattress row and we'll use the device to help us tension these. We'll wrap them around the little fly wheel and then we'll start to spin that wheel in a clockwise direction, as you see here, while we watch the screen and see our sutures. We're maintaining a downward pressure on the anchor, we're pulling on our suture bridge ones, but we're also watching the lateral row come down and really heal tightly back over across the entire footprint. And there you see the cuff moving from the lateral row. We try not to overtension our medial sutures because we don't want to cut off blood flow to the entire rotator cuff tendon where it's on the footprint. We want to have good flow there. So I think if we don't go too much but go just enough, it's okay. And that's a feel and a visual thing. You deploy the anchor, you remove the center part, and then with the scope posteriorly and then laterally, we'll take a look at our finished construct.

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So here we are unscrewing it. Once that's removed, we'll take the scope and slip it down that lateral clear cannula and take a look at our anchor, make sure it's within the bone, and then we can look at the rest of our rotator cuff. And you can see how nicely tensioned the sutures are. One of the nice things about the Versalock anchor as opposed to some of the other ones is that the sutures themselves are captured between the two components of the anchor rather than from the anchor to the bone, so we can move it, it slides more easily, and also, you don't have to worry about the sutures slipping as the bone maybe atrophies around the anchor, which does happen sometimes. So here's our final two views of the rotator cuff. A very nice double-row rotator cuff repair with a suture bridge technique. Medial mattress stitches, lateral mattress stitch holding it down, and then repairing the rotator cuff. I'd like to thank Aaron for helping me with the repair. He was my assistant. You kind of see his head in there. Very nice, he did an excellent job helping to pass sutures. It always helps to have a very skilled pair of hands in the shoulder when you're doing this kind of operation. So you can see, no pressure on the rotator cuff, no acromial spurs, and a very nice repair. So the question, I guess, is what do you do with different types of rotator cuffs? And we can do single rows, double rows, and triple rows. Triple rows are those where you do convergent stitches and then go around those to put your medial row down and then put a lateral row, and we use those for very large tears. I think the rotator cuff tells you what it needs. As you look at a rotator cuff, a small tear -- one centimeter, one and a half centimeter tear -- is fine to do a simple single-row rotator cuff repair. As the tear moves away and disvascularity develops and you're concerned about the tendon and the blood supply, I think it's better to do a double row. As the tear gets larger -- four centimeters, five centimeters -- as the retraction is larger and it moves away, I think you have to add in convergent stitches and then it needs to be a triple row repair. We do have a question about partial rotator cuff tears, and there's kind of a couple answers. It's a twofold question: do partial rotator cuff tears ever heal? My answer to that would be yes. I've treated a lot of people that come in with MRI or MR arthrogram proving partial rotator cuff tears. Our normal treatment is usually to inject them and try to achieve scapular balance and take the pressure off of the rotator cuff. And you really need to know, is that rotator cuff tear do to instability, is it due to impingement, is it due to

poor posture, is it due to repetitive insults over a period of time? But a lot of times if you can knock the swelling out with a shot and medicine, balance the cuff by retracting the scapula, it can heal on its own. In our data from Jackson, Mississippi, about one in three of partial rotator cuff tears seem to do well enough that they didn't require further treatment. Now, that's in contra-- a distinction that Ken Yamaguchi's wonderful work that said partial rotator cuff tears usually don't heal but actually progress. I think that there's a point, whether it's 30%, 50%, 70% of the tendon, I don't know, but there's a point that's critical and different for each individual where the rotator cuff has passed the point of its ability to heal. And in that case, you have to do a repair.

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Small, partial tears we usually do a side-to-side-type oblique suture rather than taking it down. Sometimes we'll complete it. It really depends on the anatomy of the tear, the configuration of the tear, and the viability of the remaining tendon for a partial rotator cuff tear. So that kind of summarizes where we are in the rotator cuff. Again, I think the key points are, one, you have to have a tension-free repair. Number two, you've got to know your biology. You have to think about preserving blood supply. That means preserving that medial bursa. Hans Uthoff has shown us repeatedly that a majority of the blood supply to the tendon in the rotator cuff comes from that medial bursa. And I think it's critical that we preserve it. In the work we've published on the rotator cuff, MRI reports, arthrogram reports, George Schoelsheimer (sp?), Chris Jones, the guys that have helped us look at our rotator cuff repairs, have noticed better than 90% healing across the board no matter the size of the tear. And I think that's due to our attention to biology. I think the next major advances that we'll see in rotator cuff repair is going to be biological. I know Josh Dines is doing a lot of work on gene therapy. And I think you'll see sutures impregnated with healing materials. I think we'll see anchors that are osteo-inductive as well as conductive. I think we'll see patches that maybe have growth factors as a part of them so that we can lay them on top and facilitate or improve our healing rates as opposed to simply covering it.

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Ah. The question is about the average time to complete this procedure. Most rotator cuff tears take me between 35 and 45 minutes. And that includes the release decompression and Mumford if necessary and the rotator cuff repair. I think that all of us have to understand that when you're operating on the shoulder, you basically have 60 minutes. Anything you do past 60 minutes, you're doubling your operating time, because you'll spend one minute cleaning out that inflamed or that swollen bursa from the inflow and one minute actually operating. And you can see, even though we were pretty quick with the majority of this procedure, by the time we came back to our lateral row, some of that lateral bursa had become swollen again. And so I think it's not important to rush through a procedure, but I do think it's important to try to be as efficient as possible. And most shoulder operations take us here -- and it's a teaching institution, but I have great residents -- most of them take about 60 minutes or less to do a rotator cuff repair. The next question is a very good one. It's about functional outcome of arthroscopic repair in the stiff shoulder. I have to say that this question is related to manipulation as well as rotator cuff repair. I have to say that I don't really manipulate shoulders. If that shoulder is tight, I'm going to do a release, and I'll do a release using a thermal device. There was a question very early in this webcast about the use of thermal devices within the shoulder. I

try to minimize that as much as possible. I don't think it's necessary in the bursa. We do use it sometimes on revision cases, but I will use it to release the inferior capsule. And in an adhesive capsulitis patient, we start off, we check the motion, we go in and we use a vapor needle-tip cautery and we'll clean up and release the rotator interval and then take that capsule release down to five o'clock. We'll then come in from the posterior portal with the scope anteriorly, release the posterior capsule just outside the labrum, all the way back down and connect that to our release in the front. We'll then take that release and come back around the top and go under the rotator cuff just like Doug Harriman used to do with the punch, but we use the cautery when we do it. So it's a 360-degree release in an adhesive capsulitis patient. We'll then come outside the joint, and this is the one indication in the subacromial area, and actually release the coracohumeral ligament with that vapor, because the coracohumeral ligament in a stiff or adhesive capsulitis shoulder is very thick and it's also, unfortunately, very vascular. And so using a cautery for that is very important. Once you do that, the patient should have normal range of motion in terms of the shoulder, and then you can go ahead and do the repair. It's not too dissimilar to the massive rotator cuff tear that's superiorly migrated and fixed to the underside of the acromion. You have to release that entire capsule and get the cuff down for it to heal.

00:37:01

The next question has to do with kind of the same thing: how do you manage stiffness after a rotator cuff repair after three months and after six months? We actually just published this. Larry Field, my partner in Jackson, Mississippi, is a terrific surgeon and a great person, and we combined our series of patients with adhesive capsulitis and rotator cuff tears that we operated on in one setting. Brian Brislin looked those up for us, and what we found was that we had over 90% good and excellent results. The majority of those patients had some residual stiffness at three months which we treated with aquatic therapy, occasionally a [indistinct] injection intra-articularly, but we did not go back and manipulate them. Only one of those 50 patients required a repeat surgery to release the capsule. And again, there's no manipulation, it was just an arthroscopic release using a cautery to get the motion back. Anytime you manipulate a shoulder after a rotator cuff repair, if it's less than nine to twelve months after the repair, you risk tearing the rotator cuff. And I think that's a contraindication to do a manipulation after a rotator cuff surgery. I think aquatic therapy usually works pretty well, and I think that's an excellent way to treat this. The next question is about the EXPRESSEW II and is it important to remove it prior to pulling the suture with the grasper. The answer to that is yes, because what will happen is that needle can actually cause some damage to the suture if you're not careful. So deploy the suture, let the needle back up, grab the suture, and then loosen the EXPRESSEW and take it out of the way so that you can pull the suture out. So you hold it and then remove that device, because you want to protect your suture. That's very important when you're doing an arthroscopic rotator cuff repair. The other question we have is about suprascapular nerve release, and I have to thank Tom Sampson and [indistinct] Foss for teaching me about the suprascapular nerve and how important it was. And J.P. Warner and I have been looking at this for some time. Our indications for suprascapular nerve release are obviously grade 2-B or more atrophy on the preoperative MRI scan, a rotator cuff that's retracted medial to the glenoid, and a revision rotator cuff repair when we're in there and they've had a good surgery. Most guys do a very nice job of arthroscopic rotator cuff repair, and so when it fails, there's usually something different

about that patient that causes it to fail. And as we look through what's going on, it could be -- maybe there are some AC problems causing pressure, it could be there was a tight capsule that let the shoulder move up and tore it apart, it could be they started therapy before the repair was ready for it. A lot of different causes, but one fairly significant cause will be entrapment of that suprascapular nerve leading to worsening atrophy, increasing pain, and the cuff won't heal completely. And so we'll slip over and basically use a slight modification of LeRon's (sp?) technique and release that suprascapular nerve. Again, full credit to Tom Sampson for first peaking our interest in it and LeRon for developing a technique that works very well to release that suprascapular nerve.

00:40:14

Oh, thanks. Next questions have to do with pain control postoperatively. I am very, very fortunate here at Tulane, just like I was in Jackson, Mississippi, and I have excellent anesthesiologists. Everybody gets an interscalene block ahead of time. The majority of patients will get an indwelling interscalene catheter to minimize their pain. I think that's a wonderful addition. I would highly recommend it. Our guys here have trained in regional anesthesia. In Jackson when I was there and we wanted to do the interscalene blocks, initially we were going to limit the people that had fellowship training, and what we did was, the anesthesia groups we were working with brought in people to teach them how to do this correctly. And with the ultrasound-guided blocks, that's been a real boon to our shoulder patients because as we all know, shoulder surgery is very painful.

Postoperatively, then, they usually have a block that'll last fourteen hours or more, or, in the case of a catheter, maybe two days or more. We use compressive cryotherapy. A lot of times I'll use a gain-ready type device or a polar care or something to provide good ice and cryotherapy to the shoulder. And we recommend continuing that kind of indefinitely. We ask them to ice their shoulder for at least an hour a day for the first three months. Ice improves blood supply to the shoulder, speeds our healing process, and minimizes swelling and also assists with pain control. The other thing we do that may be a little bit unique is I think shoulders prevent people from sleeping, so we'll usually write them about three months' worth of sleep aid, so we write a month of it to take at night and then with two refills and sometimes three refills on it so they can get some rest. Shoulders affect your sleep patterns, and I think that affects your well-being and your quality of life and certainly your ability to heal. So I think that's pretty helpful in terms of the shoulder. And then the last thing we really ought to talk about, I guess, would be where we see the future of rotator cuff repair surgery. I think in our lifetime -- Steve Snyder, Steve Burkhart, a few other guys have really taught me a lot about the rotator cuff. And certainly arthroscopic rotator cuff repair has become very commonplace and is certainly the wave of the future. I think our ability to see the cuff, to really specifically fix those tendons in exactly the place they need has become quite good. So technically, I wouldn't say we've reached our maximum level, but we're doing quite well. And I think our next focus has to be biology. I think it has to be preserving blood supply, small microfracture or blood channels created in the greater tuberosity, creating a bleeding trough to help that heal, preserving the medial bursa so we get good blood supply to the tendon, sutures coating with -- coated with factors that improve tendon healing I think will be one of the major advances. Anchors that are osteo-inductive, that stimulate bone formation. Patches with BMP or some type of healing factor that stimulates the tendon to heal more

completely and more readily, restoring Sharpey's fibers, and doing this in such a way that the patient will do better.

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The last thing to talk about is a part of that is the rehabilitation. And we're indebted to Ben Kibbler and Ben Rubin for really focusing our attention on how important the scapula is and correct posture to open up the thoracic outlet, to allow the shoulder to heal and respond to these nice techniques on fixing it. So we'd like to know that -- one last question on post-op protocol. We do passive motion with the patient on their own for the first three weeks. After that, it depends on how the shoulder feels to me when they come back in. Active motion is initiated at waist level in the beginning with the patient supine for anything above waist level. Usually around six weeks, we start progressing this pretty rapidly, depending on the size of the tear and the patient's ability to heal. The goal is to have them using their arm pretty well about three months post-op, but it takes a year to fully recover.

So I think at this point, this would conclude our webcast. We'd like to remind anybody that's interested this'll be archived and you can access it at any point in time. I'd like to, again, take this opportunity to thank DePuy Mitek for allowing us to be a part of this live webcast, to thank all the folks at Tulane University and Tulane Medical Center for allowing us to do this. I'd like to thank our patients and our assistants for allowing us to film their surgery and to be a part of this. And welcome you all to New Orleans at any point in time. Our city is back, we'd love to have you come and visit us at any point in time not only at Tulane but in the city in general. Thank you very much for your attention.

00:45:03

[end of webcast]