ZIMMER MIS SUB-VASTUS TOTAL KNEE ARTHROPLASTY
EL DORADO HOSPITAL, TUCSON, ARIZONA
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NARRATOR: Patients requiring knee replacement surgery now have a new minimally invasive option that will provide shorter hospital stays, lower blood loss, faster rehabilitation, and a more cosmetically appealing surgical scar. During this live webcast, surgeons with the Tucson Orthopedic Institute and El Dorado Hospital in Tucson, Arizona, will perform a Zimmer MIS sub-vastus total knee replacement procedure. This technique requires an incision of only 9-14 cm, compared with 20-30 cm used in a standard knee replacement arthroplasty. At any time throughout this program, you may email questions to the physicians by clicking the MDirectAccess button on the screen.

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JAY KATZ, MD: Welcome to El Dorado Hospital in Tucson, Arizona. This afternoon, we’re going to be viewing a live webcast of a Zimmer MIS sub-vastus approach for a total knee arthroplasty. We’re going to be using the 4-in-1 NexGen instruments and we’re going to be putting in a CR flex knee. I’m Jay Katz. I’m a total joint surgeon at the Tucson Orthopedic Institute and I’m going to be moderating today’s session. Dr. Russell Cohen, one of my partners, is also a total joint surgeon at the Tucson Orthopedic Institute and he’ll be performing the surgery today. We’d like to encourage everyone to email their questions in to us by clicking onto the MDirectAccess button on their screen. Now I’d like to throw it to Dr. Cohen, who is going to introduce his surgical team and give us a brief history of the patient and go over the x-rays with us.

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RUSSELL COHEN, MD: Thank you, Jay. Welcome, everybody, and glad you could join us for this exciting webcast and live sub-vastus MIS total knee arthroplasty. We’re here at El Dorado Hospital in Tucson, Arizona, planning on performing a left knee replacement. I’d like to take a brief moment to introduce our team of operating room staff and anesthesiologists. With us, we have Dr. Sansom with Old Pueblo Anesthesia; Maureen Nantz, who is a physician’s assistant, who works very closely with me. We also have with us David Flores, who is a scrub tech and scrubs most of our cases. Then we have Dave Foster, who is circulating with us.

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If we can take a moment and step over to the x-ray view box, our patient today is 79 years old. She has bilateral knee arthritis. The right knee was done through the same approach seven weeks ago. She has recovered very well. Flexion this afternoon, before surgery, was measured at 130°. Full extension, the x-ray done at her six-week visit, is seen on the x-ray box. She has mostly medial compartment arthritis now of the left knee, with osteophytes posteriorly, as well as around her patellofemoral joint. As you can see on the far left x-ray, we have the view of the kneecap, the patellae. They both track very nicely, which I have found to be very reproducible with this technique and with these instruments that we’re using today. With that, we’ll hand it back to Dr. Katz and we’ll get the patient ready for surgery.

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JAY KATZ, MD: I’d like to give a brief overview of the MIS sub-vastus approach. It’s a procedure that Dr. Cohen and I have been using now for about a year. We’ve done over 400 cases with this procedure and we use it in 90% of our primary total knee replacements. It’s a procedure that’s very surgeon-friendly. The learning curve is easy because you’re using the NexGen instruments that you’re used to using, but they’ve been coned down to fit in the smaller incision. You’re making the cuts from in front and anterior, rather than the side, so the results are easily reproducible. It’s an easy procedure to train other physicians on and residents. It is a faster procedure. It takes me 20 minutes less to do this procedure than it does to do the quad-sparing technique with the side-cutting instruments. It is truly a quad-sparing technique. You say out of the extensor mechanism completely. You
do not evert the patella. It is actually oftentimes easier to do than the more traditional sub-vastus approach, where it can be difficult to evert the patella. The exposure is excellent and it's extensible in that if you need to extend the incision or need to extend the capsular incision and convert it to a mid-vastus or parapatellar incision and evert the patella, that's easy to do. It's patient-friendly. The patients recover faster. Our patients are straight leg raising in the recovery room. They're up and walking the same day of surgery. Our average length of stay is 2.3 days. 95% of our patients go home, rather than to a rehab hospital or a SNF. The patients get off their walking aids faster. They have less physical therapy. They're back to work and back to their activities of daily living faster. The indications for the sub-vastus approach are relative. When you're first starting out, you probably should avoid doing someone with a large BMI, somebody over 250 pounds. You ought to avoid doing someone with severe bony deformities or a 20o flexion contracture when you’re first starting. You want to do someone who does not have a stiff knee, who has had multiple incisions. Avoid doing someone who has retained hardware, patellar baja, or inflammatory arthritis with soft bone. But as you become more facile with this approach, you’ll extend your indications and you’ll use it more and more often. Having said that, I'd like to throw it back to Russ now and have him show us his incision and landmarks and start the procedure.

RUSSELL COHEN, MD: Thanks, Jay. I’ve just drawn a few landmarks here on this patient. I like to put the knee at about 70o of flexion. I use a leg holder to free up my assistant. Basically, with the knee in this position I’ll mark out the tibial tubercle. I’ll then mark out the bottom of the patella and I usually mark out the top of the patella. For this case, I’ve demonstrated where the patella is. I usually will then start on the medial side of the tibercle, extend it up along the medial edge or the medial border of the patella. With the knee at this degree of flexion, usually about a finger breadth above is where I’ll end my incision. That generally gives us enough room to get to the medial side and do the sub-vastus approach.

With that, let’s get started. The tourniquet has been inflated. Again, I like to use the knee bent somewhere between 70 and 80o. If you go all the way to 90 at the beginning, it can be a little bit difficult. We make our skin incision and then switch to a clean knife. My assistant uses rakes and what we like to do is get the leg nice and stable in here and then just free up the subcutaneous tissue. I like to use sharp dissection. You can use cautery. You can use Mayo scissors. What that does is it shows us the medial side of the patella and the patellar tendon. I take a little bit of the fibers here along the patellar tendon itself. One of the things, Jay, that I think is important in MIS surgery is not to be hung up on the size of the incision. I think the incision length is relative. Some people, you can get away with smaller. Some people, you need a little bit larger, but I don’t think it’s important that you measure out the incision. What I like to do is just free up some of the subcu. Maybe for demonstration purposes we'll straighten out this leg just a little bit, but again, I usually will make the retinacular cut with the knee flexed about 70o. There’s lots of different ways of doing a sub-vastus approach. Some people like to really make a big thing out of identifying the fibers and identifying the very bottom part of the VMO. In this patient, her VMO stops right here. I don’t know if we can zoom a little tighter on that. Some people like to really define the VMO, get underneath the VMO. My approach is to feel the medial side of the patella, which is right here. I’ll then start down at the tibercle, come up along the tendon, and then we sneak around the medial side of the patella, just to about, in this case, say 10:00. I don’t like to go up further into the muscle attachment because there’s some tendon there which becomes your friend and that friend allows you retract your patella laterally, so essentially we have come up, we’ve made an arthrotomy along the medial side of the tendon. We have come up to about 10:00 on the patella. Here is the superior pole. Here’s about 10:00. Here’s the bottom of our VMO. That truly has stayed beneath the vastus medialis and therefore is considered a sub-vastus approach. I like to use electrocautery to now proceed along the joint line and do our medial release. In somebody with a varus knee, like our patient today, I tend to be a little bit more aggressive and come along to the posteromedial corner. I find it useful at this point to extend the knee. That helps get some more of the fluid. It helps us to see back into the medial gutter and allows us to do a little bit more of a medial release. You can do this with an osteotome, if you like. You can do it strictly with the Bovey. At this point, I feel like we’ve done a sufficient medial release at this point.

Now, with the lateral retractor pulling on the patella, we’re able to incise the retropatellar fat pad. This is a very important step. In order to see, you really do need to excise a fairly healthy portion of the retropatellar fat. That frees up the lateral compartment and allows us to see what we’re doing. Then, another important move at this
point, with the retractor pulling a little more superiorly, just like Murray is doing, we expose—
I don’t know if the camera can appreciate that. That is the synovial reflection beneath the superior part or beneath the vastus medialis. All I do is take a knife and I simply incise it and take out a very small part of it. What that does is it frees up your quad to be retracted laterally. Another important part is the suprapatellar fat. In the old days, when I used to open the knee fully—shouldn’t say old days, but a couple of years ago, I used to take out that suprapatellar fat and just do away with it. We know that fat is very nice as far as not allowing scarring, so I simply incise beneath it, but I don’t excise it. The reason we incise it is when we come to size the femur, that becomes important so that our stylus is resting directly on bone. As far as the soft tissue approach, that’s how I start. Jay, anything different that you do?

JAY KATZ, MD: No, and I just think it’s important, as you’re putting that retractor in, to emphasize that when you first start, you want to cheat and you want to extend your capsular incision up all the way to the superior pole of the patella. When you get into that nice triangle of tendon, you ought to save that because it is your friend. That’s what you’re retracting against and it actually makes it easier, I feel, to save that and not go up higher.

RUSSELL COHEN, MD: I agree. As such, you’ve kept all of your vastus medialis attached to the quadriceps tendon, making this an absolutely quad-sparing procedure. I know some of the times when I would do the quadsparing, it was a little bit disheartening that some of the VMO would actually be incised and detached from its tendon attachment. This way, we’re absolutely leaving all of the quadriceps intact. I’ve just taken out the ACL. I think what you can appreciate, though, is the amount of lateral retraction of the patella. No eversion. It shows us the end of the femur and with that, we’ll start by doing our step drill.

JAY KATZ, MD: Now, Russ, one other thing I’d like to point out is that you have not cut your patella yet.

RUSSELL COHEN, MD: That’s correct. The reason I don’t, Jay, is once you make that cut, your bone is cancellous and is quite soft. When you retract against that bone, you end up crushing it. The other reason I don’t is that it becomes, without having made any cuts, it’s difficult to get that patella held up on end.

Excuse me, let me just switch over, Jay. Right now, what I’ve done and what I like to do, I like to get this guide beneath my quads, beneath the VMO. Murray has put an army-navy. We’re not over-retracting. We slide the wand down into the IM canal. I basically tease it underneath the quad, making sure that I’m clearing the tibia, and then we make sure we’re clearing the skin, clearing the bone. You can hear when you’re down and Murray can see it. Then what we do—is sorry my arm’s in the way, but basically we now have that wand down. We’re at 5o of valgus and that’s relatively standard. Unless someone has a prosthesis in their hip, I almost always cut them in 5o of valgus. That is now setting directly on bone. It is beneath our quad and is attached to the distal femur, ready to be cut. I like to take the wand out so that I’m not cutting around that intramedullary wand. I think you can appreciate there that we now have our distal femoral cutting guide in place, ready to cut. Murray and I switch hands, switch places. We go ahead and do our cuts with direct visualization. Again, the thing that I like about this particular procedure, as opposed to, say, the quads sparing, is that the instruments are somewhat anatomic to use. I’m not cutting from the side. I can see my angles. I can get a good clinical picture of my valgus angle. It’s pretty simple to use. So that’s the distal femoral cut. I, at the beginning, try to complete my femur and then go to the tibia. I’ve since found that it’s much easier to now proceed to the tibia in that it makes room to then size accurately the femur and we’ll do that next. The next step right now is to resect our proximal tibia. I use an extramedullary guide. Jay, you use extramedullary?

JAY KATZ, MD: Yes, I do. I notice that you’re putting that under the skin, but on top of the patellar tendon. Is that correct?

RUSSELL COHEN, MD: That’s right. It sits very nicely. The skin is mobile here. I put some lateral tension on it and I like to use a combination of guides. I use the stylus and I put the 10 mm stylus. I don’t make a big point of delivering the tibia forward at this time. I don’t think it’s really necessary. I know she’s got a medial deficiency, so I don’t want to over-resect medially. I find that it’s important not to take too much bone. I like to look both medially and laterally, as far as setting my depth, but I’ve got the 10 mm stylus sitting on the lateral
prominence. The other thing I like to do now, before I finally set it, is just to eyeball it again, make sure we're good, and I can then set my valgus, tibial valgus and varus angle. I use the center of the tibia and then I look at the side and I make sure that we're not excessively forward, which will attenuate the slope. This is a 7o posterior slope guide and I think you can appreciate here we can flex this up just a little bit more now that we've got our guide on. We're centered over the tubercle, maybe just a hair medial, and then we're coming down the shaft of the tibia. Murray has repositioned this retractor to protect our tendon somewhat and then I'm going to go ahead and put a Crego, which we've got around the medial side, inside the MCL and that's going to protect us from getting the medial collateral ligament.

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JAY KATZ, MD: So, Russ, even though you use the peg tibial tray later, you still want to cut with a 7o slope, is that correct?

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RUSSELL COHEN, MD: That's correct and I do that for appropriate rollback and for clearance of the PCL so that I don't end up too tight and rolling back excessively in flexion.

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JAY KATZ, MD: How are you sure you're not going to cut the PCL with that when you don't have a retractor back there?

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RUSSELL COHEN, MD: I don't like to put a retractor back there. You can put a retractor behind there and deliver your tibia and protect it. I like to have a feel and I just make sure that when I go through the posterior and the central part, that I don't go diving. I just think it's more of a feel for me than to put a retractor back there. What I like to do at this point is make sure that my cut is complete, and it appears as if it is. I find it easier to remove that tibial tray. I support under the knee. I use an osteotome just to free it up and then we put a clamp, a Lahey, or we can put a Coker on there, something that will help hold it up. Then I start centrally and I basically incise the PCL attachment to the back of the tibia. As we know, it has a fairly extensive posterior attachment. I think you can see that we've got a nice cut here on the tibia. We're not overly resected on the medial side. We're taking between 9 and 10 mm on the lateral side. That's about as much as I like to take on the medial cut. Jay, do you do anything different with the posterior cut?

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JAY KATZ, MD: No, except that I do feel more comfortable with a notch retractor in there.

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RUSSELL COHEN, MD: Do you deliver your tibia away anteriorly?

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JAY KATZ, MD: Halfway, probably. I also use that notch retractor once I've made the cut. When I put the osteotome in there, if they have soft bone, I want to be careful not to lever down on the tibia, so I'll use the notch retractor, actually, come more proximally and use it to lever the tibial fragment out.

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RUSSELL COHEN, MD: Sure. We've got a picture of the femoral sizing guide. By taking the tibia cut and doing that, we can now very comfortably slide in our femoral sizing guide. You can see they're flush against the condyles. I like to bring the rotational bar to the anterosuperior part, anterior, really, of the femur, just so that it's resting flush. Then I'll use some spring-loaded pins to secure this. You want to be cautious not to over-tighten them, as it'll sink in too deep. You won't be able to size the femur. The stylus won't move very well. Sorry if my hand's in the way for a moment. You can see that now we've got our sizing guide flush. It's against the posterior condyles. If your quad is heavy and thick, a male that's got a very well developed quad, you can extend the knee at this time to 30-40o. That relaxes the quad. The guide needs to be watched so that you don't crush into your cancellous bone. So now that our quad is relaxed, we've slid the stylus beneath the quad and beneath the fat pad that we basically elevated but didn't excise. We now have it resting on the lateral side of the anterior femoral cortex because that's the high spot. If you rest it in the sulcus, you're going to be undersized. This knee sizes exactly to an E. In a routine type of varus knee, I'll use 3o of external rotation. If she had a valgus knee, I might be tempted to do it in 5 or 7 if there's hyperplasia of the lateral femoral condyle.

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JAY KATZ, MD: Russ, when you measured with the stylus, did you measure down in the valley or up on the lateral femoral condyle?
RUSSELL COHEN, MD: It’s important to do it up on the lateral prominence of the anterior femur. If you’re in the sulcus, I find you notch the femur and you undersize, so I try to go on the high spot, Jay. How about yourself?

JAY KATZ, MD: The same. Now, when you use 30° of external rotation, do you double check that at all with Whitesides line or the transepicondylar axis?

RUSSELL COHEN, MD: I think in this particular procedure the Whitesides is easier to use. It’s easier to access, but you can extend the knee a little bit, get your finger on the lateral epicondyle and the medial epicondyle, and you can then use the transepicondylar axis if you want, but I like to basically trust that my guide has rested on the posterior condyles, that I’ve set it in the right spot. Then once I’ve made my resection or actually put my guide on, you can see these gold pins, Jay, that have marked my rotation. They then allow your femoral sizing guide to simply side in. Again, this becomes a bit of soft tissue management, one side not fighting the other. Now we’ve got our femoral finishing block in place and I use the screws that we actually use for acetabular components. You can see the screw and it acts for two purposes. It drills our peg holes for the femoral component and it holds it in place. I then like to remove these gold pins. Jay, one thing that I find useful is I’ve got the leg secured in the leg holder, I’m pushing up under the femur, and if it’s internally or externally rotated, that flexion space is going to look asymmetric. You can use different devices, tensioning devices, to check that, but I find this to be quite valuable. The patient’s leg is tensioned. The flexion space looks good. I also get a sense of how much posterior bone I’m taking and I’m comfortable that I’ve got a rectangular flexion space. It’s important to keep your retractors inside the soft tissue envelope so that your blade doesn’t inadvertently cut them, as far as the MCL.

JAY KATZ, MD: Now, this is the jig for the high flex knee, is that correct?

RUSSELL COHEN, MD: That’s correct.

JAY KATZ, MD: It’s the gold jig and you’ll be taking 2 mm off more posterior than you do for the regular CR knee.

RUSSELL COHEN, MD: That’s correct. It takes more bone off posteriorly and it’s all done in one cut. What Murray just did was kind of important. He put the retractor up more under the muscle, so when you do your anterior cut, you don’t go injuring the muscle. That’s what we’re striving to protect. Your assistant can be very valuable in helping you feel when the blade is through. If your retractors are in a good spot, he can tell me right away you’re through and he just indicates with his finger and you don’t go skiving. So we’ve made our cuts. We’ve got one more to make, but I like to remove the anterior bone and I like to remove the anterior chamfer so we can then make our little notch cut for the CR. So now we’ve taken that piece out. We’ll use a reciprocating blade and this becomes just a follow your guide and a minimal cut. I’m going to use this just to freshen up my chamfer.

Okay, so now we’ve made all of our femoral cuts. We’re going to remove our screws, remove our guide. Murray’s just repositioning so that we can have access to our chamfer cuts and posterior cuts. Jay, is that the sequence that you like to do it as well, or do you like to do your femur first?

JAY KATZ, MD: No, I always do it the way you did it. By taking out the proximal tibia, I think it makes this next step easier.

RUSSELL COHEN, MD: Right. You’ve obviously got to take care where you put sharp instruments, like the osteotomes. I use an osteotome to tease that bone and then, if it’s got adherent capsule, I’ll just use the Bovey to remove it. Jay, do we have any questions from the audience at this point, any email questions or burning questions people have?

JAY KATZ, MD: There was one question asking how is this different from normal knee replacement arthroplasty and how common are blood clots and infections following surgery? Basically, this is a normal knee arthroplasty, done through a smaller incision, so at a year, the end results should be the same, but the real difference is in the first few months for the patient, by staying out of their quad and cutting down on your soft tissue dissection. Also
we found that our blood loss is less and the incidence of blood clots is also slightly less. We use a Coumadin protocol on our patients, but we also have our patients walking the same day of surgery and I think that helps.

RUSSELL COHEN, MD: I agree. This is not about reinventing the wheel or inventing new implants of prostheses, although the implant that we use is the high flex. It’s not brand new, but it’s been out for I think 2-3 years. That certainly allows patients the deep flexion that a lot of people really want. It doesn’t automatically give it to them. What we’re doing is taking implants that have been around, that are time-proven to work and to do very well, and simply putting them in without all the soft tissue trauma that takes so long to recover from. If we were putting these in and seeing patients with knees that were not well balanced or the implants weren’t being put in correctly, that would be one thing, but I’ve been extremely pleased with the angle of the cuts, with the way the patella tracks, and with the way the ligaments balance. These knees have been so much more stable as far as the medial side and the lateral side just not being wobbly or the ligaments being too loose. I find that the less you disrupt, the less you have to find a way to balance at the end.

What I’m doing here is I put a trial tibial plate to size it. I make sure I get as much coverage of the bone as I can and with it we put this boom on it to make sure that our cut is neutral or straight in line with the tibia. This cut should be perpendicular to the long axis of the tibia. If it was angled like that or if it was angled the other way, our cut would be asymmetric and we’d have to re-do it, so that’s a real simple, quick, easy step to make sure that your cut’s been done correctly. While I have the knee in this position, Jay, I think it’s important to go after those posterior osteophytes or bone spurs.

JAY KATZ, MD: Russ, I have a question from the United Kingdom. The person says that they’re going to have a total knee replacement done sometime soon and they’d like to know if there’s an orthopedic surgeon in the United Kingdom doing this kind of procedure. The answer to that is yes and the best way to find out if it’s available in your area is to call your local hospital.

RUSSELL COHEN, MD: That’s correct. The other is to visit the Zimmer website and if there’s a physician who is comfortable with this and has posted such on the Zimmer website, that would be a great place for them to find who might be local or close by that they may want to have this done. But yes, there’s definitely resources available as far as finding out.

One thing that tends to happen with the cut-down or the narrow guide is that you tend to have a little extra bone left over on that chamfer cut, the one femoral cut, so we basically just smooth that off and finish that. Now, the other thing that you can do, you can use spacer blocks. I’m not a big fan of spacer blocks, but certainly for people who would like to use that, spacer blocks can be put in. You can check your tension, your extension space, and you can certainly also check your flexion space and this is a good time to do it if that’s something that people would like to do.

As we’ve removed over 1 cm worth of bone, you can see that the soft tissues really relax. This is one of the main reasons I like to do the patella now. We can comfortably get that patella to 90o, turned up on end. We can place some towel clips beneath the tendon and the muscle, expose the patella without stretching the VMO or the vastus medialis, the big muscle that’s very important in controlling our knee and our extension. We measure the thickness. It’s very comfortable to see it. It’s 21 mm. We now use a saw blade to freshen up the cut or to make the cut and we give it a feel as far as the thickness. I feel like I’m a little thicker on the medial side. We take a caliper again. What I do, once I’ve made the cut, is I now take the caliper and we’ll measure again. We’re at 12.5 and we are at 12.5 or 12, so within 0.5 mm of thickness from one side of the patella to the other and that’s what we like to see, a nice level cut. We then use different sizing guides, lollipops to size the patella. I know on her other side I used a 29 and this side looks like a 29. So now I’ve popped the guide into the bone. Murray’s going to drill the holes. These are the peg holes, which go into the bone and help to secure our implant once we cement it. At this point, we’ve made our bony cuts and we’re going to go ahead and replace our instruments. Jay, do you use a freehand cut?
JAY KATZ, MD: I use a freehand cut and you made it look very easy. I think a trick when you’re first starting out is just to keep in mind exactly where your anterior patella is and try and make your cut parallel to that. You have to cut it 3-dimensionally accurate, not bevel it.

RUSSELL COHEN, MD: What we’re going to do now, Jay, is trial everything. We’re going to go ahead and put a femoral trial in. I like to do that first. We take care to seat that beneath the quadricep up top. Murray’s not over-retracting. The pegs go into the peg holes that we’ve already drilled and we seat it down, make sure that our cuts are accurate, that our chamfer cuts and our anterior cut all looks nice and flush. It’s easier than putting everything in with the knee in flexion. I like to just get a little bit of flexion of the knee. I put my tray in there. I don’t know if we can see that. Then just a little bit of support beneath the posterior part of the knee allows us to slide the tibial tray. We make sure our quadricep remains out of the implant. We make sure that it’s sitting well. Then we go ahead and put our plastic button. This little button is what the real patella looks like, the real patella button, and it goes into the holes that we drilled.

JAY KATZ, MD: So the thickness of your patella should be basically 21 again.

RUSSELL COHEN, MD: That’s correct. Now, when I go through my checks, my range of motion, I like to make sure that the knee comes into full extension. That’s most important. If you can’t get the knee straight on the table, you’re not going to get it straight in recovery or in physical therapy. It’s going to remain stuck and the patient won’t be happy. The next thing we’ll do is check our flexion range of motion. Here you can see from the side view that the only thing limiting this patient’s flexion is her thigh and her calf. She’s got in excess of 140-145° of flexion here on the table. You can check it just by supporting her femur, making sure she drops that way. She really does have nice motion. We then obviously have to make sure that our ligaments are balanced. What I mean by that is when we wiggle or move the knee from side to side, we want to make sure that we’re not too loose on the inside or too loose on the lateral side. That is a very important part of knee replacements. When I was talking, Jay, about these particular surgeries, less soft tissue dissection means less tension or less balancing when you’re done. You’ve left it pretty much intact. You’ve made the appropriate cuts and the knee is balanced very nicely. The other thing, with the cruciate retaining, we make sure that it doesn’t roll back and get too far back or it gets too tight in flexion. What I would like to try on this knee right now, Dave, is to try a size 12. I just want to see. I’m very satisfied with the 10, but I’d like to see if I’m more satisfied with the 12. By doing that, I want to make sure I’m not compromising the knee’s ability to straighten. Does that look straight to you, Jay?

RUSSELL COHEN, MD: Yes, you’re in full extension. That looks excellent.

JAY KATZ, MD: Now, Russ, if it was too tight in flexion, what would you do?

RUSSELL COHEN, MD: That’s a great question. Too tight in flexion means that the size of the femoral component is too large, so as you bring your knee into flexion, that space in flexion is too tight. If it’s balanced how you like it in extension, then you know that your tibial cut is good and the end of your femur cut is good. Your distal femoral cut is good. So the nice thing about this NexGen CR flex system is that you can go to a minus size on the femur and a minus size on the femur undersizes or takes off 3 mm, I believe it’s 3 mm, on the posterior condyle or the dimension from front to back, so as you flex your knee, you’ve now given yourself an extra 3 mm of space. That is a wonderful bail-out when you’re a little bit tight in flexion. These implants are perfect. 12 on the tibia.

JAY KATZ, MD: What percentage of the time do you end up putting a CR flex minus knee in?

RUSSELL COHEN, MD: You know, I don’t use it very often. I’ve probably used it less than 5% of the time, Jay, but when I need it, it’s just an absolute wonderful asset. I don’t know what your experience is.

JAY KATZ, MD: It’s the same. Sometimes if I’m in between sizes and I know that the size I’m using is slightly too large, I will go to the minus knee. I’ll just know it up front, that I’m not taking quite as much bone off the posterior condyles as I want, but I’m in between sizes and I don’t want to take off too much.
RUSSELL COHEN, MD: That’s correct.

JAY KATZ, MD: So I’ll make the cut, knowing that I’ll just go to the flex minus knee. You are taking off 2-3 mm less posteriorly.

RUSSELL COHEN, MD: Correct. The thing that’s nicer about doing it that way and building it into your implant is that you don’t have to either go to cruciate substituting or PCL substituting, and you don’t have to, if you want to stay with the cruciate retaining, do a PCL recession. PCL recessions are okay, but they certainly can take off occasionally more of the PCL than you want. What we’ve done now, Jay, is we’ve exposed our tibia. We’ve taken everything else but the tibial tray off and we’re going to finish our tibial preparation. At this point, we have plenty of room to see everything, to identify our soft tissue that may have been left behind, and then also to finish our tibial preparation. It looks like a little bit of the lateral meniscus is still there. We’ve got plenty of visualization laterally. We can take that off. Okay, now what we’ll do is take what I like to call a pickle fork, Dave. A pickle fork is a PCL retractor. We slide that down through the posterior part. What that does, with the knee in deep flexion, this is really the only time that I’ve had the knee in deep flexion for exposure or any of the work. It exposes my tibia very nicely and allows me to do the preparation. I use a peg tibial tray. I’ve used it since my fellowship in Chicago, which is partly where this was designed. It has a tremendously favorable long-term follow-up. It provides great rotational stability. It’s less invasive, most importantly to me, and gives us nice tibial fixation. Certainly, though, a stem or a keeled tibial tray is a doable thing. I’ve done plenty of LPS or posterior stabilized by implants using a keeled tibia. They work wonderfully well and can be doneOI think you can see from the exposure, you can have plenty of room to put a keel in.

RUSSELL COHEN, MD: That’s correct. I just drilled a couple of holes. Usually, Jay, on the medial side that bone scan be pretty sclerotic, so I like to just drill it and that allows penetration of the cement.

JAY KATZ, MD: While you’re getting ready to cement, Russ, I have some questions. One is that this is a life surgery webcast. How long does the procedure take you under normal conditions?

RUSSELL COHEN, MD: So far, our tourniquet has been up 37 minutes. We talked for a while before we actually started the operation. Typically I’m putting in the implants at 27 minutes, 28 minutes of tourniquet time, and the complete tourniquet time, on average, is 45 minutes. That means from the time that I inflated the tourniquet to the time that the skin is completely closed and the preliminary bandage is on the patient. That’s the typical time.

JAY KATZ, MD: I have another question about problems getting the patella out of the way of the 4-in-1 block. They wanted to know if we have any clips for clearing the patella away from the 4-in-1 block when you’re getting ready to make your cuts. The person here said that he tried to externally rotate the tibia to clear it better.

RUSSELL COHEN, MD: You know what works, I find, the most useful thing, if you let your leg, say on this left leg, if we let the leg drift toward me, it keeps the tension on the quads. If you push the actual leg away from you, like Murray is using a rake and he’s pulling with that rake toward him, what that does is it subluxes the patella, just like somebody who has a valgus leg. As you do that, your lateral retraction becomes much, much easier. I think a lot of it just comes with practicing, putting your retractors in the right spot, getting that piece of tendon between 10:00 and 12:00 on your patella, adjacent to the vastus medialis, using that to help retract, rather than tearing your muscle and not getting the retraction that you want. I think those two things are very important, Jay. What about yourself?

JAY KATZ, MD: I agree with both of those. Another question is this person says that he’s confused about the different names. They read about MIS arthroplasty, quad-sparing, noninvasive, sub-vastus. They’re confused by all those terms.
RUSSELL COHEN, MD: Sure. It is confusing and a lot of people get confused because there’s a lot of different definitions of what MIS is. Everybody’s feeling of what MIS is is a little bit different. To me, MIS means minimally invasive. Perhaps it should even be less invasive, or LIS, surgery because you can see what we’ve done is not exactly noninvasive. This is a big operation; we’ve just done it through much less soft tissue dissection and trauma than we would have done ordinarily. To me, it’s a matter of how you handle the soft tissues, how you can get the implants in satisfactorily without disrupting an entire soft tissue envelope and an extensor mechanism, in this case, and then having to just repair it all and let it heal. This way, we’ve taken as little soft tissue dissection to expose the joint, to use instruments that have been designed to help with the process, do a well balanced knee and allow the patient to recover in a much more timely fashion with less pain and less effort. To me, that’s my definition of MIS.

JAY KATZ, MD: And I think you’ve demonstrated this so well. I think the concept of a mobile window is important. You don’t usually have three retractors in at once. Whatever side you’re working on is the side where the retractors are. You don’t hyperflex the knee up. Less is more a lot of times, so when you flex things up, it makes it tighter. You’re doing things in a little bit more extension.

RUSSELL COHEN, MD: That’s correct. No question. Normally, with the median parapatellar, that knee is in deep flexion for most of the case. I rarely, and I demonstrated that, I think, that the only time I’ve got this knee in deep flexion is now so that I can deliver the tibia. Having Murray work with me, not against me, and working with himself, rather than against himself, as far as moving the window so that I can see what I need to see at any given moment, rather than just wide open exposure that most surgeons are used to having. Maybe we can show here, just for a second, Dave, we’ve got our tibial tray. I put cement underneath it. I put it on the pegs. We also have the cement up under the anterior part. One of the things that’s hard on this is that you can’t get your cement gun directly on the anterior cortex, so I put it on the implant and I also put it on the runners posteriorly. I think we have a slide of that in the presentation as well. I’m going to get going so we don’t lose our cement. I like to get 2-3 mm of intrusion into the bone. I’ve cleaned it, I’ve dried it, and I like to use a gun. You don’t have to, but you certainly get nice intrusion of the cement and we get a nice, uniform layer, but also putting it on the implant assures that you’ve got a nice, uniform layer. I like to just dry the cement, get some of the blood off there, and then we take our tray, we put it in our peg holes. Occasionally this can be a tricky move if you’ve got a real tight knee and you have to slide that posterolateral part of the tray under the femoral condyle in order to get it down, but hopefully you can see that we’ve got plenty of access to the entire tibial tray. I rarely, if ever, see any cement left behind on my post-op x-rays. We can access the posterior, medial, and lateral joint. We can access the lateral better and Murray just has eased up medially to give me more room laterally and it really gives us a nice exposure and I’m not leaving behind big pieces of cement. So that’s the tibial tray.

At this point, I bring the leg out just a little bit more and Murray moves his retractor up to that tendon spot a little bit. What that does is it exposes our femur better. I’ll take the cement and the parts that I do have access to are the distal femur and the anterior chamfer. Again, we try and get our cement intrusion there. It’s pretty rare to get loosening of the femoral component. I think with the cement on the femur as well as on the femoral implant, we’ve got plenty of coverage and no defects. Now you have to play with the leg just a little bit. We want to slide this up underneath the quadriceps. I’ve got it inside the peg holes. Murray’s got his lateral retractor, giving me plenty of room, and it looks like we’re down and it feels like we’re down. We have access to our lateral gutter, so we don’t keep cement in there.

JAY KATZ, MD: I think it’s important when you do this, just to make sure you don’t get your quad trapped under the anterior flange, just run your finger up there and make sure you don’t get it trapped.

RUSSELL COHEN, MD: That’s right and what I do is, in this case, you can’t really get under your quad, so I’m pulling so I’m not scratching my implant. I’m keeping the articulation separate. We’ve now relaxed our quad. We run our finger under there. I make sure that there is no cement on the anterior flange because it does extrude as you set it down. I think you can see there that we’ve got our quad out of the way. We can see all around. At this point I like to irrigate so that if there are any loose pieces, we can get them flushed. I think you can see that we...
can see all the way to the back. I can see if any cement has extruded up and we can certainly get rid of it. Let’s have the final tibial insert. Again, I used to put my knee in deep flexion to put it in. Now, a little bit of flexion, about 15o. You angle the tray, you snap it, and then you flex the knee up a little bit and we put our device in, which secures it and it just snaps in. You can hear a nice, audible snap. As the implants have seated themselves a little bit more, we may get a little extravasation of cement. It’s important to remove that. We’ve got plenty of time as far as the cement. It’s nice and doughy, but not getting hard yet. So now our tibia and our femur are completed. As I said, we get a little bit of cement that we can access quite easily. We can still see laterally. Let’s go ahead and just clean off our patella. At this point, your patella, I’m not evertting it; I’m just standing it up on end 45-90o; it doesn’t matter.

JAY KATZ, MD: Russ, how often do you do a lateral release with this procedure?

RUSSELL COHEN, MD: That’s a great question. I’ve found that with some of my older techniques and releasing all the VMO from your quad, it’s not unusual to see some lateral lift-off and do a lateral release to help with that. I don’t remember the last lateral release that I’ve done. That’s just as honest as I can be. My x-rays almost all the time show just wonderful tracking. I think that has to do with the instruments, the 4-in-1 instruments, as well as, probably more importantly, the quadricep mechanism being just completely left intact and not disrupting the pull of the lateral part of your quads, compared to the medial part, by having had those spared in this procedure.

JAY KATZ, MD: What if they had a laterally subluxed patella to begin with? Do you try and cheat over and put the patella more medial or the femoral condyle more lateral when you’re putting it in?

RUSSELL COHEN, MD: Yeah. I think there’s several things that you can do, Jay, to fix that. One is to make sure that your limit alignment and your valgus cut is correct. If someone does have a lateral truly subluxed patella, it’s worth getting some long leg films, planning your valgus cut, and external rotation of the tibial tray relatively internally rotates the tubercle when you’re done and that helps to improve central tracking. The other thing is to lateralize your femoral component so that your groove is more lateral. Then the other thing that you can do is to medialize your patellar component. Let’s just put the knee through a range of motion again to make sure we like how things feel. She just feels nice and stable in flexion. She’s got plenty of flexion, good rollback. Her varus/valgus stress is I’d be hard-pressed to call it even 1 mm of liftoff. This is probably a good time, I think, just to outline for everybody the vagus medialis. You can see that my VMO—mine, not the patient’s—is completely still attached. It is completely left intact. Here is the down side of the arthrotomy, which I’m going to repair. There are no muscle fibers in there. This is probably a 2-3 cm snip into the capsule along the medial side. It makes a world of difference as far as making this knee go smoothly, less difficult, less struggle, not having to use side-cutting instruments or reinventing too much of the wheel. The patient, I think, will benefit as much as going through those types of hoops to make the patient feel good. I like to use a Hemovac drain. We just sneak that in laterally.

JAY KATZ, MD: Russ, I have some other questions. One was about the high flex knee. What is different about it and why do you use it?

RUSSELL COHEN, MD: The high flex knee allows, by its design, patients to flex into the deep areas of flexion, 130-150o, without causing the problems that we know with a standard prosthesis you might have in those deep ranges of motion. What it does is the design has allowed that to be incorporated so that the patients, if they are able to achieve such mobility, don’t run the risk of prematurely wearing their plastic or having problems in the posterior part of the tibial try. I use it, I would say, almost routinely, especially since I do MIS knees on basically everybody. I don’t exclude many people at all, unless there’s incision, which just simply can’t accommodate it, so therefore, I use the MIS because I think most patients are able to achieve those high ranges or close to them and not worry about premature wearing of the polyethylene.

I’d like to point out here, for closure, we’ve got the knee closer to 90o now. I think what that does is it lines everything up. It allows the soft tissues to line up side to side. I’ve taken a suture here right at the apex, where I made my nick at about 10:00. I then take another stitch and put it just posterior—actually, it’s really medial to it,
to prevent any further splitting of that little neck. It’s mostly tendon to tendon. Some of it can be a little bit of muscle, but what that does is it just prevents any further splitting of that retinacular incision. Then I use a nonabsorbable suture. Jay, do you use absorbable or nonabsorbable?

00:56:21.000

JAY KATZ, MD: I use nonabsorbable sutures in the capsule and I use absorbable sutures in the subcu. I have another question. They want to know, when you put that 4-in-1 cutting block on, sometimes it will come loose or wobble. What do you do to prevent that?

00:56:40.000

RUSSELL COHEN, MD: I use those screws to help drill the hole, but also to stabilize it. I find that to be very stabilizing as far as not creating a wobble. Occasionally someone has soft bone. If that happens, you can take some of those threaded pins that we use and put them on the side as holes for those and that also helps stabilize it.

00:57:03.000

JAY KATZ, MD: I use the screws also, but if the patient has soft bone, I’ll use the threaded pins. You have to put them in the more superior holes of the 4-in-1 block or they’ll get in the way of your chamfer cut.

00:57:17.000

RUSSELL COHEN, MD: That’s correct. I rarely have to do that. I think the screws really do a nice job. One thing, Jay, that you may want to talk about briefly, while I’m finishing closing, is your anesthesia protocol and what you do.

00:57:32.000

JAY KATZ, MD: Right. I think this procedure is great and to stay out of the extensor mechanism is really important, but I think to really maximize this, it’s a whole protocol. The anesthesia we use with this is either usually a Duramorph spinal, where they get 100 or 150 mcg of Duramorph, which the motor function returns after a couple of hours, but it knocks a lot of their pain out for 24 hours, so I haven’t had to hook a patient up to a PCA pump in a long time. If for some reason they can’t get the spinal in, we use femoral nerve blocks for that. I think it’s also important to have everyone on the floor know what you’re doing when you’re first starting. It’s important to have the therapists there to get the patient up the same day and get them walking. I use CPM machines right in the recovery room and start their knee bending 100o. I think you do not use the CPM machine.

00:58:36.000

RUSSELL COHEN, MD: I don’t. I encourage them to bend. I usually go visit them in the recovery room. I’ll get them straight leg raising, get comfortable with that, and then I also show them how to drag their heel so that they can do active flexion. I do get them out of bed the day of surgery and I certainly like them to at least sit in the chair, if not walk, and frequently the earlier cases in the day are seen by therapy. They do walk quite a ways down the hall and it seems to work very nicely. I think the anesthesia protocol is very important, Jay, and I think, as you mentioned, there are different ways to do it. I think whatever you’re comfortable with in your institution or your anesthesiologists are comfortable with is the key. I’ve not had any wound problems. To be very honest with you, I think not over-retracting is important and these patients really heal quite nicely, without any problems. I use a running subcuticular and these are absorbing. Nothing has to be taken out. I like the wound to look pretty because that’s what the patient sees. They think if you do a nice job on the skin, you must have done a nice job inside, so we’ll take all the advantages we can get.

00:59:53.000

JAY KATZ, MD: Russ, I think we’re running out of time. You did an incredible job. I’d just like to thank everyone at El Dorado Hospital, the Zimmer staff, the SLP3D staff for making this possible.

01:00:10.000

RUSSELL COHEN, MD: I echo those thank yous very much. The OR staff, the facility, and the production crew, you guys were terrific. I’d like to take a quick picture, Jay, if we can, just of the incision. A lot of it is done with the knee bent, which makes it look longer, but once you straighten out this knee, it’s about 3.5î and heals very nicely. That’s my final thank you to everybody and I’ve certainly enjoyed the process.

01:00:35.000

JAY KATZ, MD: Great job, Russ.

01:00:37.000

RUSSELL COHEN, MD: Thank you, Jay. You too. I appreciate it.
NARRATOR: This has been a live webcast of a Zimmer MIS sub-vastus total knee replacement procedure from El Dorado Hospital in Tucson, Arizona. For more information or to make a referral or make an appointment, please click the buttons below.