DePuy® Rotating Platform Revision Knee Replacement
Spring Valley
Las Vegas, NV
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Good afternoon. I’m Doctor William Barrett from Seattle, Washington. Thank you for joining us today at Spring Valley in Las Vegas, Nevada where we will be observing Doctor Russ Nevins perform a revision total knee. Russ will be using a DePuy RP Revision Knee system with metaphyseal sleeves. A few reminders: you can mail us your questions by clicking the button on your screen. Russ, why don’t you tell us about this patient and how you evaluate the patient with a painful total knee.

Bill, thank you very much, and good evening, everybody. I’d like to thank everybody on the East Coast, as well as the West Coast, and in the center. Thank you for being here. Our goal today is to talk about a revision total knee arthroplasty using DePuy’s mobal bearing sleeves. It is a revolution, not an evolution in knee replacement surgery when it comes to revisions. It is completely different than any other system, and the goal today is to go over the technique and explain why this is so different and how unique this system is.

There’s three reasons that I love this system and three great reasons. First, it’s a mobile bearing knee. It has unidirectional wear, but it decreases that kinematic conflict that all of us deal with with fixed-bearing revision systems of higher constraint, leading to more sheer forces and more wear. In addition, it has biologic in-growth, metaphyseal sleeves. Now don’t be confused, these are very different than cones. The goal of these sleeves is to bypass bad bone and get to good healthy bone. It makes a mediocre surgeon look great because they’re so easy.

The beauty of this system is not only is it mobile bearing to decrease wear, not only does it have porous-coated sleeves, but also it’s easy and it’s versatile. Whether you use a cam and post, you use a hinge, or you use a tumor prosthesis, it’s the same tibial base plate. It makes it easy in the operating room and makes it easy to get out of trouble if you get into trouble. It’s a wonderful system for that.

And the last point about these sleeves that I want to discuss, I have to tell a little story about this. And I think it will come – it will all make sense after I go over this. When I was a kid in college there was a parent weekend, and my father came up, and I went to my physics course with him. And this really smart kid was sitting next to me. He’s one of these Westinghouse scholars and we were working on parallel and series circuits. And this guy made this wonderful system that was so complex I had no idea what he was doing.

And I looked at my father, and my father who’s probably the smartest guy in the world, turned to me and said, “Russ, when this guy’s not here how are you going to fix it?” And I said to him, “I have no idea.” And he said, “That’s the problem.” Smarts come from making things simple and making them reproducible, and that’s the fourth part of this system. It makes it simple and reproducible.

Whether you’re a joint surgeon that only revises your own joints and you do six of them a year, or whether you’re a guy like myself doing 650 joint replacements a year, this system works from the easiest to the hardest cases. So it’s the perfect revision system for everybody, and that’s what I hope to show you today.
Now the case that we're going to do, I can show you the X-ray. This is a beautiful – a very, very nice, very pleasant 67-year-old female. She had a Stryker Triathlon Knee done approximately two years ago. She had no signs of infection early on. She had wonderful motion. She was bragging about how great her motion was and how her therapist loved that she could bend this to 135-degrees right after surgery. But she kept hurting and she kept aching. She kept going to her surgeon, and unfortunately he looked at these X-rays and said, “Everything looks beautiful.” Unfortunately, she kept hurting. So she came to me and we did a thorough work-up. I examined her hip, and always with revisions you must examine the hip. Her hip was normal. I had an intra-articular hip injection; that was normal as well. I got blood work, which I do on all my revisions, including a sed rate, CRP, and ESR; all normal. Bone scan to rule out loosening; that was normal. White cell scan normal. I aspirated her knee, normal.

I did a physical examination; low and behold, she had a slight effusion, she had great motion, and she was lax in mid-flexion. Classic mid-flexion instability. Now traditionally we talk about infection being a main complication. We talk about patella tracking problems being a main complication. But today, with modern knee replacement, mid-flexion instability, flexion instability is one of the major complications.

I was talking to a wonderful surgeon from California, Dr. Gorab, about a year ago. He looked at his studies and, sure enough, about a third of his cases were flexion instability, just like this patient today. And I find the same exact thing. Now people ask, “How do you diagnose it?” First of all, you have to rule out the other things; loosening, infection, malalignment, you rule all that out. You do your physical examination. An effusion, pes tenderness, retinacular tenderness, great motion, and instability in mid-flexion is classic signs and symptoms.

When we look at her X-ray, at first glance she has an AP and a lateral, and I want you to look at the AP on the left and the lateral all the way on the right; it looks like a pretty good X-ray. The surgeon did a good job. Nothing with the AP, I see, that there’s an issue with. But if we look at the lateral here, everything looks nice and tight, but when I got a lateral with a true view of the poly, I want you to look very closely. The poly is right here and it dips down. There’s actually a gap between the femoral component and the polyethylene, that space. Why? She’s lax. She has instability. And that’s what we’re going to fix today.

Now there are some very nice studies that show how to fix this. The first study, excuse me – the first study was by Dr. Pagnano. And he looked at CR knees and he converted them to PS knees, and 19 out of 22 improved. I argue if he did a higher level of constraint that they all would have improved. In addition, Dr. Firestone does a study with PS knees with instability, and he revised them, increasing the amount of poly and taking a little more distal femur to match it, and low and behold all of them got better. So today, that’s our goal, to give this woman a nice – this patient a nice, stable knee with a higher level of constraint, without the concern of the kinematic conflict of more constraint leading to early loosening. So we’re going to head over to the knee right now and let’s begin our case.

Why don’t you orient us to the patient? You’re performing a revision left knee; that’s correct?

This is a left total knee arthroplasty. Now for time, I’ve already done the exposure. She has beautiful full extension. I open the knee – and we’ll talk about the exposure in one moment – and low and behold – I hope you can appreciate -- let’s come from the straight angle -- if I put a Cobb elevator in here, her whole medial side opens up. In fact, I can translate the entire CR knee wide open, almost to the point of dislocating.

Now I was trained that – and I recognize that all of us have different ways to look for flexion stability. The way I was trained is that my tech here will hold the leg -- this is Laura -- and I will put a Cobb at 90-degrees, and I'll look to see that only a millimeter of opening is on the medial side. Here, clearly we have almost a full centimeter gap; that's way, way too loose.
What happens frequently with us as surgeons is we like extension, so when extension is good, we accept loose flexion, and that is a crucial mistake. A third of all revisions today are for this error. In terms of exposure, I do a standard median power patella approach, and then I do a thorough synovectomy, and it’s paramount to do a synovectomy. I’m going to show you the synovial tissue that I took down already. You could see it’s a whole bunch of tissue, even on a simple case. And I’ll do that by using two towel clips and just coming around the entire gutters medially and laterally. I do not need to avert the patella, but if the patella will avert, terrific; if it doesn’t, I just tuck it laterally. If at this point I’m still tight, I then will take two towel clips and bring down my extensor mechanism and do a rectus snip, bringing this laterally. If that still won’t work, my last option is a tibial tubercle osteotomy. So those are my tricks to get good exposure.

And as you can see here, we’re going to flex the knee, we have absolutely beautiful exposure. So at this point, we have our exposure. Let’s talk about revisions. Remember my father, keep things simple. I do every revision exactly the same way, and it works for every single case. The algorithm never changes. So we start with exposure, exposure, exposure. The one-eyed man is king of the blinds. Next step, after exposure, is I take out the poly, I take out the femur, and then I take out the tibia. So let’s head out. Let’s go on and let’s start that. Hold that. Osteotome and a mallet. Small osteotome and a mallet. Now if the system has a screw in it, you should be aware of that. Know the system that you’re working with.

So, Russ, I’m just going to remind our viewers to email their questions during the course of surgery if they’d like anything specifically answered.

Switch. Switch. So once I have the poly out—now, a quick little trick to get the poly out, is if it’s a mobile-bearing system, or if it’s a system with an old post, you can always dissociate the post from the keel and that way it will slide out from the front and then you can take the keel out afterwards. Once I have my poly out, the next step is to get the femur out. So I do a little synovectomy right against the gutters. Now in a traditional system, every other system, the goal is to save as much bone as you can. Every osteoblast counts. And why? You have to get a good condylar surface to cement onto. You have to get a good plateau to cement onto. If you don’t, then you’ll get cantilever forces which will lead to loosening.

This system is analogous to using a solution type stem, or a (INAUDIBLE) type stem, to when you have no calcar and a hip replacement. I don’t need every osteoblast distally. We try to keep it, but it’s not paramount like a traditional system. So I use an oscillating saw, not a Gigli saw, I don’t try to save every osteoblast, and I’ll just remove this by gently freeing myself up here. So we’re just freeing up.

Next step is I’ll take a Morlen hockey stick, wonderful instrument—mallet, please—and this will get my posterior chamfers and gutters cleaned up. And with an open box, like a system like this, I can go through the box. Now I agree there’s many ways to do this. You can use a TPS, a pencil-tip bur. You can use a Gigli saw.

So, Russ, you’re trying to stay between the metal and cement interface as much as you can?

Absolutely. I stay right on the metal cement. In fact, the cement will burn at times and melt away. Rake here, please. Now again, though, you know, the question becomes what’s paramount? When I’m fixing in the metaphysis, every osteoblast is less important again. The other issue becomes tourniquet time, and when you start using Gigli saws and you try to save every osteoblast, you lose that time. I would rather save that time because I don’t have that worry. Rake. Okay.

Now, again, we use the Morlen. Just trying to free up. And now I have the Morlen punch. Can we see that? So here’s the punch, which is critical for me. That goes right on the anterior condyle. And I just gently tap that off. Now here’s how much bone we lost; virtually nothing.
That’s all cement that you’re seeing. And here is my condylar surface. But, again, with this system, if I did happen to break off, and I’m human, it happens, you break off a piece of bone, I’m not worried because my fixation is in this spot right here, deep in the metaphysis.

If I have a bad field goal deformity, traditionally, that would scare us; and what would we do? We do things like using femoral heads. The problem with that is, when they work, they work great, but a percentage of them, as we know, can resorb. They can subside. I don’t have that worry now.

So our next step -- we’ve done our exposure. We’ve take our poly, taken our femur. We now go to our next step, and that’s taking out our tibia. Again, you’ll notice, I’ve done no thinking so far, no trying to figure out joint lines. Rongeur, please. Everything is step by step here. So I’m just looking for the interface, now, between the metal and the bone. Now, some may ask, “Well, if she’s losing flexion, why don’t I just put in a thicker piece of plastic?” But that’s not the answer because, again, she was perfect in extension, so we have to revise the whole thing. Now, I’m going to, again, use my saw here. And I’m going to start cleaning at that interface, Bill. Okay. Stacked osteotomes, one, two. Bring it out a little more like that. Beautiful, Laura. Thank you, Lisa.

So, Russ, you must be fortune teller because our first question that came in is, “Why not just replace the poly,” but you answered that question before it was asked.

Can I have the saw for a moment? Yeah. See that? It’s a good question, but that’s still a mismatch, and we don’t want mismatches. Beautiful. Now, I took that out. You’ll notice that took about what? 15 seconds. Now, low and behold, I have a little gap, a little segmental defect here. Whether I caused that or not is irrelevant. Now, in a normal system, again, when you’re trying to build up the plateau, that’s concerting, it’s a weak spot. My fixation is metaphyseal. It’s no problem, whatsoever. This system works beautifully on defects, beautifully on segmental defects, you just bypass them.

They are not, and I repeat, they are not cones. Cones are very, very different. A cone system, the idea is that you rebuild that by building it up with some form of metal, and then you still cement your base plate into that. Cement is static, and if you have cantilever forces, that can still, as it cantilevers, cause loosening, ultimately, in the long run.

Once I get everything, my next step is I work on the tibia. Remember, the tibia affects both flexion and extension. It’s too confusing and I don’t like to think. So the goal is to eliminate a variable that does both. So the next step is we prep our tibia. Now, this system – Bill, can you see this?

Yeah, we can see that well, Russ.

How about now?

Yeah, that’s good.

Okay. So these are the reamers, and they go up sequentially. I use a non-cemented 75 stem. And I’ll measure it. And there are lines on this system; one, two, three, four. So I always measure it to make sure that I know what line I want to go to. In this case, the second line is perfect. So I will ream down to where my cleanup cut is going to be, to the second line. The whole system is ream, broach, cut off the broach, put your trial in, you’re done. So we’ll go to the second line to where my cleanup cut is. That’s one.

I like power because I like power just to get chatter. Some people will – some people like to use hand; I can’t fault them for that. You can do it either way. I’ve never had an issue though, with using power. And I like that feel of the little chatter it starts to give me, I know if I’m good or not.
So, Russ, how do you determine what diameter stem you’re going to use?

Based on the chatter I’ll get. And right now we’re at – what size is this Lisa? This is a 13. So let’s see how this feels now. Now that’s tight already. The sleeves do so well that you don’t even need to use them in cases that you feel you don’t want that, you don’t need that extra supplementation. When I’m in a case when I’m between sizes like this, I’ll go down to a 12. I’m using the sleeve for, number one, alignment for my tibial cut and my tibial base plate; and number two, provisional fixation while I get biologic in-growth. I’m not using it to depend on it for the long-term. So I’ll go down a size; I’m not afraid to do that.

So in this case, I didn’t like the 13. It’s a little too tight. I would prefer to use a 12. The next reamer – can you guys zoom on this, please. Let’s zoom in on this reamer. Perfect. This reamer opens up for your sleeve, and you can see it’s conical in shape. So I will just bury that right to where the actual splines end, right here. And that will give me room.

And so you have a 12 trial stem on your reamer, correct?

Absolutely. And, again, because I want that for my alignment, Bill. So this gives my alignment so I know I’m reaming in the proper direction. And everything, even if I choose not to use a stem, I still will the stem for preparing the tibia and the femur for it’s alignment value. Okay. Now this is the broach. The broach has an anterior side and a posterior side. So please make sure you read that. You’ll notice they are nice, sharp broaches. They bite in beautifully. So they prepare for the stems beautifully.

So this will go in – I put this into the tibia. Now it doesn’t have to be lined up like in a fixed-bearing system with a middle third of the patella tendon. You want the best fill because the stem, although – the sleeve, although it cold welds to the base plate, there’s rotational freedom in the system, so they don’t have to match perfectly. So we’re just going to gently tap that in. And you tap it down until the flat top of the sleeve. The broach is nice and flat with where your cleanup cut will be. And, at this point, you rotate. This is nice and loose. So that’s too loose, so we’ll go up in size. And I will keep going until I get rotational stability. That’s the key; rotational stability for this.

One other point is, you’ll notice these are not round, they actually have an elliptical appearance which helps with that rotational stability.

That matches the proximal metaphyseal flare of the tibia.

Correct.

And so the point I’m emphasizing is that of this sleeve pendant placement of your tibial base plate because it is a mobile-bearing design.

Now, how far do you broach this and where’s your cleanup cut? The system has buildups on the smallest one. In addition to the buildup, there’s an actual buildup that’s part of the tibial base plate that’s 15 or 25. So you can go 25 millimeters up if you need to add more metal. Then you have 30 millimeters of poly. So you’re talking about over 5 centimeters of buildup on the tibial side. So I will go as far as I need to get a decent cleanup cut all the way to the extensor mechanism, the patella tendon, without injuring it. Now I don’t do that if I don’t need to, but if I need to, I’ll do that. So we’re gently tapping in our third one now.

Russ, we have a question from the Midwest.

Please.
Will you ever under-ream your stem by a half millimeter?

Well, not by a half millimeter. I’ll do it by a millimeter if I feel uncomfortable with it because, again, it’s only there for alignment and provisional fixation. But I think that’s more than a reasonable idea if you feel that it’s getting a little too tight. These reamers, though, come in one millimeter reamers, so. So once I like the rotation, and I’d like to show that again. The rotation is nice and tight. This is not going to go anywhere. Whether you have a segmental defect or not, these don’t move. And although I picked a relatively common case that all of us go through, and the most complex cases that I do with tibial tubercle osteotomy in an open anterior aspect of the tibia, they grab on like a gangbuster. So these have -- like I said, they make a mediocre surgeon look good because they just fit the same exact way, a solution fits, the same way a (INAUDIBLE) type stem fits. Once I’m happy with the rotation, now I’ll do a cleanup cut off of this.

So how much – Russ, how much bone do you move with your cleanup cut?

Well I will move – here’s the thing, I’m not trying to get a perfect fit here. I’m not worried about cantilever forces that you have to get to the strong subchondral bone in a traditional system; that’s not the problem. Here, my fixation is now inside this sleeve, so even if I have a segmental defect, I don’t mind if it’s there. So typically what I’ll do is I’ll go down until it looks like it’s going to be a relatively clean cut.

Even if I have a gap after I put my trial, it’s okay. I’ll fill it with cement, provisional fixation, while I get biologic in-growth. The most distal I’ll go, again, if there’s a big defect, and really it’s for a pretty X-ray, is down to the level of where the extensor mechanism attaches to the tibia because I don’t want to ever damage that; that is the worst complication you can have in a revision knee.

So now we’re at the stage that we’re happy with the location of this. Now I’m going to do my cleanup cut. I’d like to show you a device that DePuy has – can I have the jig – which I honestly never use, but it’s here. This is a device that, a tower, you can put on this that will allow you to make a pretty cleanup cut by using a jig. I don’t use this, and the reason I don’t use this, again, is because my fixation is in the metaphysis, my alignment is from my stem that’s in there; so I’ll do a cleanup cut, and even if there’s a little gap, it’s okay. It’s not like a traditional system that’s got to press against it so you get no cantilever forces.

So at this point, I do a cleanup cut directly off of this and I gently clean it. Now I always protect my MCL and watch out for my MCL. Again, if that happens – if I lose my MCL, and God knows it can happen to any of us, my tibia is the same, I go to two more jigs and I can go on an S-ROM hinge, beautiful system, not an issue. I, of course, always protect it and it’s never happened to me, but I’m only kidding. But the idea is that it’s there for me if I need it. Now I’ll do the medial side first because that’s always where our better exposure is. And then I’ll put my broach on. My broach handle goes on and the broach comes out. I’m sorry.

You need to use a narrow saw, because otherwise you’ll hit that post on your broach.

Now I’ve cleaned my lateral side using my medial side as my block. So it’s nice and smooth across. I’m going to bring this a little more anterior so we can make sure we get that bone. The most difficult bone to get is always in the anterior lateral aspect because we’re always scared of our extensor mechanism. So you want to make sure that’s nice and freed up so that doesn’t catch.

So, Russ, maybe now that you’ve made the cut, you can just show us, with your head back, how you use the medial side as your guide? If you’d show the audience how you use your medial side as your cutting guide for the saw.

Sure. I would be more than happy to. Let me just clean up this lateral side so you guys don’t think I’m a sloppy surgeon here. Okay. Great. First thing I want to show, if I may, is can we look
down the canal here? Remember, this is not a circle, it’s an ellipse. We have to keep that in mind when we put the final one in. And I’ll show you the trick to make sure that you put it in appropriately later.

I don’t know if you can appreciate or not, but these sleeves use ZTT technology. What ZTT technology means – can I see the trial – is steps, these steps. The steps are incredibly revolutionary because it changes not normal bonding, but now you have hoop stresses, Wolff’s Law. So now what happens is when you take these out, if you ever need to take them out, all your in-growth occurs right at that junction; just what Wolff Law would predict. So it’s right in the junction here where there’s porous coating. And when you broach, you can actually see those steps.

Now I don’t know if you can appreciate with this camera, but you can actually see those steps bond. When you get X-rays two years later, you can appreciate traditional spot welds right in those areas where the porous coating is. Now, in terms of the cut, Bill, the cut, I use the medial side like so, and I come straight across. So I use the medial side as my cutting block to get the lateral side. Does it have to be perfect? Absolutely not. Do I strive for perfection? Of course I do. But it doesn’t have to be because of this.

Biology happens here. It grows here. The base plate is cold welded to the sleeve, so the base plate cannot move. It’s not in cement. The cantilever forces can loosen. So what happens under here is exactly analogous to a bridge with water underneath it. Because you have the columns, you can have water under the bridge and the bridge is nice and safe. It’s the same principle.

When I put the trial in now, I look for an anterior and a posterior, and I’ll place this in where it belongs, where I broached. Now I’ll put my base plate. Now how do I pick what size I use? I’ll take the largest size that will go medial/lateral on the femur, because the biggest size that I can use closes down my flexion space and flexion instability is always the problem. So we’ll look at the largest size that will fit without gross overhang. This happens to be, in her, a 2.5. Let’s see a three. And a three is overhanging quite a bit, so we’re going to stick with a 2.5 in her.

Now you can look at – for the tibia, that tells me, because I want the biggest to close down the flexion space, I can do one size above, the same size, or one size below. There are little trials that can give you an idea of what size will fit. The reality is I don’t use these as well because I’ll take – I know what size tibia I want based on the femur. So now we going to – let’s take a size 2. Okay. I take my size 2 and I’ll turn it like this. And I’ll see if it looks like it’s going to fit.

Now the question always becomes, “But I love offset stems, I’ve got to have my offset stems,” and with this system you can’t have it. I argue you don’t need it, and the reason why is this, offset stems are to get you the best coverage on the tibia because you don’t want cantilever forces. In this system we talked about, again, that’s not a issue. Number two is, because it’s mobile-bearing, I don’t have to worry about my Q angle and align this up with the extensor mechanism. So I can rotate my tibia to get the best coverage. So I will go down a size if there’s overhang and rotate it and that’s never a problem about having offset stems in this situation.

So, Lisa, you know what, let me have the saw. I just want to clean up right here. Let me have a Homin for one moment. Again, I want to protect my MCL. And I’m just going to clean this up a little bit better here. Okay. Let me have my size.

Now once this is in, then I’ll put this in, and I line it up where I want it. Once I know where I want it, I’ll gently push it and then I’ll tap it down with a little mallet. Now, if we have a gap – let’s look at a gap here. Do we have a little gap here? Absolutely. Does it matter? Absolutely not. My fixation, like a solution stem, is distally. I can fill that up. I get provisional fixation while I get biologic in-growth. So it doesn’t have to be absolutely perfect. You strive for perfection, yes. Do you have to have it? Absolutely not. So we’re going to accept that.
And now, without doing any thinking again, we go straight to the femur. So, exposure, take out the poly. After we take out the poly, we take out the femur. Take off the tibia. We go to the tibia. We're done with the tibia. Next step is the femur. With the femur I, again, put a 75 stem. And I'm going to measure this. And this will be the fourth line this time. So we're going to go to the fourth line. Okay?

I find my intramedullary hole and I go to the fourth line, to the high side of the femur. So, one, two, three, four, and, again, Bill, I got to chatter. Once I get chatter, I'm happy. Now some surgeons like to bring their hand as posteriorally as possible, trying to close that down the flexion space. I think it's fair to try, but the reality is, I find, when I go to broach, it pops up anyway. So I'm okay. In this system we have the privilege of going down two millimeters, a femur down two millimeters.

The thing that I'll do is I'll ream both my tibia and femur at the same time to save time because I know I'm going to be reaming them both and, obviously, my femur is typically going to be bigger than my tibia, and I've got my reaming done at once.

What size is this? Bill, you know something, I think that's totally fair. What I'd like to do is see you do it because what happens with me is I find – I like my Homin in here translating the tibia. So I find it always a little bit of a nuisance when I do that. But either way works. There's nothing wrong with doing that. And it does save some time, I think, if you have good exposure and it's, you know, an easy case. No, that's good.

So we got to a 16 in this case. The next step is we're going to open up for our metaphyseal sleeves. Again, we have a conical type reamer; this is a different reamer though, and it's a conical type reamer, and there's two lines. Now there's four broach sizes. Because I like to do everything exactly the same way, what I do is I prevent problems later, so I always use the smallest one. I do that purposely because later, when I have to think, if I need to bring my joint line down, then I'll have at least two more sizes to fill the space I make. There's many ways to do this and my way is not the right way, but for me it works reproducibly every single time.

So I'm going to go to the small one now. And, again, that small – the first line, which is going to be for the smaller broaches, goes to the top of the high side. And now I begin to broach. The broach has a medial side. Can you guys zoom in on that? I don't know if you can see it but it says – there we go – "medial." You have to make sure the medial side is medial, but it doesn't have to be lining up – it doesn't have to line up with the epicondylar axis or Whiteside's line. It's a fill again because you have the rotational freedom between your condylar surface and the sleeve later. So I start tapping that down.

Now there's three lines that we're going to look at. And I don't know – maybe – yeah, you can see it there. There's three lines right here. The first is for TC3, the next says – it says LCS, then S-ROM, then TC3. The TC3 line is the one I'm going to go to. Now each one is four millimeters different. So if you want to save four millimeters or either millimeters of bone, then you can always go to a higher one at first.

Again, I don't like to think. I like to do everything the same way. So I always do the TC3, but I use a small one, even if it's a little loose here, because later I can use a larger one to bring it out. So I'm going to tap this down. Now, Lisa, can I have the angel wing? We're going to put an angel wing right over here. Lisa, hold that for me please. And Laura is going to tell me when my TC3 lines up with my angel wing. So that lines up now with the high side of the bone. Even if it's loose, as long as it will hold provisionally, I'm content at this point.

So now I just remove my broach handle and that's where my fixation is, deep inside where there's healthy good bone. This bone, the condylar bone, which we're so used to depending on, now is no longer the issue. So if there's a big field goal deformity, it's not an issue. You have great fixation in here.
When I first started doing these, I’d try not to do these because I was afraid of losing bone, and like all of us, we’re trained you must save bone, must save bone. But the reality is biologic fixation is so much more important to me than trying to save the osteoblast; it’s a poor osteoblast to begin with. So once I have my broach handle in – my broach in, now everything’s built off the broach. So just like the tibia, which was reamed distally, broached proximally, cut off – cleanup cut off the broach, put in your trial. Same idea here, distal cleanup cut.

This is a revision cutting jig. We’re going to switch now again. And it’s a very slick jig actually, and unfortunately, I don’t think you’ll get a good view of it. But you can change the varus/valgus up here. And it’s set at five because my stem is set at five. And then you can dial in the amount of distal resection. With four millimeters of distal resection, that’s a cleanup cut. Can I have an angel wing first? I like to check it with an angel wing just to make sure that looks kosher. So that looks great there, so we’re going to pin this. I’ll take the pins.

Now this jig has many options to it. You can move it down two millimeters, move it up two millimeters, and then it’s got slots for augments. So the next step now is let’s cut distally. And I always start at the top slot, which is zero, a cleanup cut. Now, again, notice I haven’t looked at my flexion and extension space yet. I don’t try to figure out where the joint line is. I do all my cuts and then after I’ll show you how I do that.

So now we’ll make our cleanup cut. That’s a beautiful cleanup cut. And that’s a beautiful cleanup cut. So we’re done here. If one side was too low and I had bad osteolysis, I would move down four millimeters, or move down eight millimeters. What I do at that point is I tell Lisa, my tech, I say, “Lisa, zero medially, four laterally.” She writes it down. From then on, that ratio will stay the same. So I’m zero here, four laterally. If I need four millimeter augments later, it will go to four and eight, or eight and twelve, twelve and sixteen. It never changes. So she writes it down and we know we’re at that ratio. In this case we’re at zero/zero, so we’re okay with that.

So, Russ, basically your goal is just to get a flat platform onto, which you’re going to put some cement in your femoral component.

Exactly, Bill, provisional fixation for my biologic in-growth. And the other important thing about the condyles is rotation. It will help me with my rotation for good patella tracking later. Now this is – once we’ve done the distal, now we do the anterior and posterior. There’s a left and a right side. This is a left patient. And there’s three different options here. There’s neutral, and then there’s plus two and minus two. And, again, I can’t remember which is which. So it’s FU or femur down. So we’ll put the zero in first.

And then I’ll take an angel wing and I’ll stick an angel wing in and I’ll see if I have room. If I have room here, I’ll try my femur down because I want to close down my flexion space. So let’s see, Lisa. Let’s go to a femur down two. And let’s just take a look and see if it looks better or if it looks like we have too much and we’re going to notch. That doesn’t look bad so I’m going to take that. In fact, what’s interesting about this case, if you ask, “Why does patient have flexion instability,” well, one of the problems is she was anterior referenced.

When somebody has a high notch and you don’t want to – they have a high bump anteriorly and a primary and you don’t – and you anterior reference and you don’t want them to notch, what do you do? You raise your component. You raise your component. You leave that flexion space loose and then end up with a situation like this two years later for a revision. So we’re going to close down our flexion space here. I leave my angel wing in there.

And the next step that I like to do is I’ll find my epicondyles and then I’ll put a pin in and try to make it parallel to the epicondyle. Once I do one pin, I take out my (INAUDIBLE) and I’ll have Laura hold onto the handles, and I’ll bring the leg to 90. Bring it down a little more. I’ll bring it to 90 and I’ll look and see if I have a symmetric box. If I have a symmetric box I’m happy. If it’s not
symmetric with my ligaments tight, then I have to fix that. And, in fact, I try to cheat too much and I have her a little externally rotated too much. So I'm going to correct that because I left a second hole here purposely. So the bone isn't too soft. And I'll do it again now.

Now some people like to use a spacer block. I think there's nothing wrong with doing that. You can use laminar spreaders. There's nothing wrong with doing that. The key is you have to recognize the idea that you must have a symmetric box and do whatever is in your best interest to get that symmetric box. So I have a nice symmetric box here. I'm very happy with that.

You can see, I'm not looking at the bone, I'm looking at the metal -- to the metal, and it's beautiful. So I'm happy with that. So now I've got my rotation and now we're going to cut. We'll put our second pin for a little more stability. The reality is that the broach handle here gives us stability as well. So there's our anterior cut. Now there's three lines here. We always start with the most distal one -- or posterior one, and that's a zero. Now you can see that's a big air ball.

So now what we're going to do is go to the four millimeter, big air ball on the lateral side, on the medial side. That's perfect. If there's any concern, please, I beg all of you to protect your collateral ligament; that is the biggest catastrophic -- although, if I had to I can go to my S-ROM, four medially, and we're going to do eight laterally. So, again, we're now four medially, posteriorly, eight lateral; that's important, not for fixation as much as it's important for rotation. So now we pull that out. I'll take an osteotome.

So, Russ, your primary reference here is your cut tibial service; that is your platform on which you're building this revision knee.

Absolutely. Now in a hinge, when you have no medial collateral ligament, you can't trust your MCL, and that's why you need a hinge. So at that point, you have to use your epicondylar axis. But remember, you've got to use and trust your judgment. Rotation and patella tracking problems are the biggest with a hinge. So you've got to check, double check, and triple check, and make sure that your patella tracks properly with a hinge. I'm just going to clean out some of our soft tissue envelope here that's lousy. **Recording stops at 42:15**