High Performance Partial Knee Replacement

Indiana Orthopedic Hospital
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Welcome to this OR Live webcast presentation, live from Indiana Orthopedic Hospital in Indianapolis, Indiana, and brought to you by Depuy Orthopedics. In just moments, you will have the opportunity to see a bi-compartmental knee replacement utilizing the Sigma high performance partial knee system. The procedure will be performed by Dr. Jack Farr, an orthopedic surgeon who helped design this partial knee solution. Dr. David Fisher, the director of the joint implant service at Methodist Hospital in Indianapolis will moderate.

Viewers can send their e-mail questions to the doctors or request more information to learn more about this newer approach to knee replacement. OR Live, the vision of improving health.

Good afternoon. My name is David Fisher. I’m the director of the joint implant service of Indiana Orthopedic Hospital in Indianapolis, Indiana. I’d like to welcome you to this webcast of a live surgery performed in our operating room today. What you are going to be visualizing is the use of a high-performance Sigma partial knee system for a bi-compartmental replacement of a patella-femoral, and a medial compartment. The surgery will be performed by one of my partners and associates, Dr. Jack Farr.

The patient who is having this procedure is a 54-year-old female, who has medial and patella-femoral arthritis, as we can see from her X-rays up on the board here. She has medial compartment arthritis in both knees. This is her standing AP view. When she flexes we can see bone on-bone-changes in the medial compartment and in the patella-femoral joint significant to femoral arthritis.

She’s had previous arthroscopies on two separate occasions in the past ten years, disabling pain, limited function, difficulty going up and down steps, and recurrent diffusions and discomfort. So she has consented to have a bi-compartmental replacement, and at this point in time what I would tell you, the audience, is that if you have questions you have the ability to end us a question by pushing the “Ask a question” button and then entering your question, and it will be transferred to me by paper, and I will see that it’s addressed by either Dr. Farr or myself.

So we’ll go ahead with the procedure and switch our cameras and take a look at the operative field.

Tourniquet up. Good evening. We’re just inflating the tourniquet. We’ll do a standard midline incision just like for a total. In fact, because of the size, we will be making a generous incision. The deeper approaches certainly have the option of a sub-vastus or a split. I’m going to use a straight parapatellar. It’s going to allow me to visualize the entire knee. It will be the same approach that you might use for a total. So I think you can see now where we are.

So at this point I’m just going to go along the medial parapatellar incision. Pick up. Rake. Okay. And we’re just exposing. I’m going to come with my incision right along the anterior horn of the medial meniscus. And basically I’m going to separate this procedure into a uni-compartmental. I think from a biomechanical standpoint, uni-compartmental is the one that will take precedence, and then we’ll fit the patella after that.
And just to take a peak, she does have exposed bone over her trochlea. Has exposed bone over the entire panpatellar mid-waist of the patella. I can sublux the patella. Her lateral compartment is intact. Her medial compartment has exposed bone. We'll be able to see that obviously better as we do exposure. Pick up. So I'm just going to elevate the capsular attachment. Our goal here is to remain intact. Certainly with the MCL when we're doing uni's, we want to use that as our reference guide and set our gaps.

In this particular patient, she has mechanical access of three degrees varus, so we want to honor the natural anatomy. We certainly wouldn't want to put her in any degree of non-physiologic valgus, which she probably had at one point in her life. What I'm doing now is take the Rongeur. Our guides are going to go right up to the tibia. I also don't want to be misled on tensioning the MCL, so I'm taking off osteophytes medially and laterally. And while I'm here I'm also taking them off the trochlea because that will aid in sizing. You don't want to be misled and have a larger trochlea that's actually hanging over osteophytes.

So you have not released the mediolateral ligament. You have just done a meniscotibial ligament release.

Exactly.

And she opened up probably five, six millimeters in extension.

She will, as soon as I get these osteophytes off.

Yeah.

Okay. So I think you can see now she has exposed bone all along her femur and typical anterolateral wear. All right. You have a -- this is our alignment rod. You have to maintain exposure. And our goal of this alignment rod is to duplicate the slope of the patient and so these are typically set up and used universally for totals. Give me the pin.

So what I'm going to do is lay this right on top of my guide, and looking for the side, I can see I'm duplicating the slope. And then this vertical slot is going to allow me to do some fine tuning. I'm using the pin here to place this right in line with the ACL. So I have the alignment here on the second ray going into the ACL, so this should be -- she this set on eight.

So there's two ways you can reference sort of the high/low concept. High, I'm looking at the tissue of the articular cartilage that's just underneath the medial meniscus anterior horn, which is usually intact, or I can reset this and go down to two, and I'll go down to the defect, and you can see those are fairly similar. In fact, let me just have the drill. Let me take that pin out. I'm just going to bring her a little bit more distal. I don't want to under resect nor over resect. There we go. So we'll at look at this. Check it. That's right on. We're two.

Do you have a preference on whether you like to take the low point or the normal point.

I go back and forth. I'm just trying to get more comfortable with it. That high point came from Ray Randall in Australia.

Yeah.

And I think in the U.S. we have a tendency to use the low point. So I'm trying to get more experienced, and I find that some cases, especially when there's a lot of bone loss, I like to be using the high point because if you'd be taking too much if you went to the low, at least in my mind.
So you’re trying to make a nine-degree cut to the tibial access.

That’s correct. Can I have a knife.

With a slope of a few degrees, depending on the patient’s normal slope.

Yeah. And if you’re worried about some of these patients that have sort of have a nominal ACL, you certainly wouldn’t want to increase their slope.

Okay.

I think there have been – as we all know, there’s a couple studies out that suggests that that may decrease the – okay. You have this set up? They had the TPS on the opposite one. Very good. So this is a sagittal saw. If you can see it here to the side profile, there is a little cutout here. This allows me to go all the way down to the tibia front and back without having to tilt my hand. And I have a pin right at the base of the tilt cut, and what that pin has done is kept me from sweeping too far under the medial imminence with my first saw, and then it’s also keeping me out of the imminence in the sagittal plane. You certainly don’t want to extend your L cut.

And there’s usually just a little lip of bone in the front that remains, and the sagittal saw can come over. That should have our cut loose now. Just put it into a little extension, and he got the majority of it. Can I have this piece. Does anybody have a trial? What’s this? Is this a three?

So we pre-sized her to be either a three or possibly even a four. Let me see a four. And we want to have good coverage. We’re covering front and back, so this is a four now. And once again, I think we’ll have to decide, but that’s really close. I think we’re having the four be a little too large, so we’re going to see what a three looks like on flexion.

Our goal here is to have the ability to put this in and have a nice flush fit, which we can see here on the medial aspect. I’m able to move it back and forth. I’m not too tight. And I can always adjust this later on, but I don’t want to take too much bone initially. It’s going to get us down into meniscus.

And that was your seven-millimeter block?

That was a seven-millimeter, yeah.

Okay. All right.

Now here is the sizer we can stick in. And the sizer also says three/four. So that’s just a triple check there. The next is, so I know we have -- let’s add one. She has an osteophyte and some cartilage on the margins that are going to actually push me off that exposed bone. So I have the option of sizing. If I do not add a spacer, I’m going to be taking six off this femur, and so I added one, so I’m taking just a little less.

And that spacer is going on the proximal --

On the femoral side of the cutting.

Yeah.

I’m putting this in the midline of the knee, and you can see we when we’re on the tibia, the overall varus valgus of the tibia looks good. Now the top rod, this extension, the purpose is not to go to the hip. What we’re trying to do is make sure that we duplicate the flexion to equal the slope, so we’re going to get a 90-degree cut. Can you hold this us a little. So she’s just holding it. Down a little.
So her slope was fairly normal. If you want to exaggerate the slope in your mind and then you put this jig on with the knee extension, whatever amount of slope is, you’re going to end up with your femoral component being placed into the amount of extension that your tibial slope was.

So the flexion there was to compensate for the slope that you cut into the tibia.

Exactly.

Yeah.

Because what I’d like is to have is a 90-degree cut here.

So what he’s trying to do is to keep the joint line near its anatomic position by bringing the femoral resection distally one millimeter, and that seemed to balance the knee in extension, so it will match the flexion space, I believe. Jack, is that correct.

That’s exactly what we’re trying to do. And I’m just going to take off that femur. Can we get the light so I can see. Sometimes there’s a little residual bone posteriorly. I’m just trimming that up using my flat cut as a reference.

So right now you anticipate using a seven block or seven tibial insert?

Yes.

Okay.

That’s sort of what I shoot for. Rongeur. And if I have to go larger, that’s fine. But I think if we can maintain ourselves in the densest bone without elevating the joint line the better. With the saw, sometimes your saw will just skive off. As we all know, the bone is a little bit denser right in this region, and your saw will have a tendency to skive, so you want to make sure this is flat. Now can I have the tibial guide back.

So what I’m going to try to do here is try to orient my femoral component along the axis, because I want to make sure that it’s fitting well with my tibia, and I want to make sure that we’re following anatomy. So what I’m going to do here, this is going to be my midline of my femoral component. I want to check the midline of the tibial component. And then I want to make sure where my femoral component is going to match as far as the sizing. In other words, I’d like to have the femoral component always on plastic. I don’t want it to be in space. So this is a size three. Could I see a size four.

And what are the criteria? How do you size this femoral component?

Well, so I first sized it looks at the tibial component hit near the linea terminalis. And then the second one is, I’m looking -- I don’t want to have it so long that it’s going to impinge or the patella form articulation or be off the bone. So here is a size four. That’s just like we saw before the, tibial component. She’s between a size three and a four.

Can we focus on the very top of that cutting -- that block to see where it hits the condyle of the femur. Raise the camera just a little bit, the overhead right side camera, or zoom in off this one. Okay. The right camera shows the best picture, and, yeah, where the anterior leading edge of the implant is going to rest --

Right there --

Is that going to be counter sunk or is it not? I can’t tell.
That will be counter sunk. Okay. We have to put these -- going forward. We have these new drills, they go forward and reverse.

So now we’re pinning the cutting block into position. This is a combination, drilling and cutting block.

Is it flat? We want to make sure that we’re nice and flat. This is going to be where -- you asked if it was -- there was an inlay there, and, yes, it will at the very top. This is just a little chisel to meet up with that first cut. So that’s preparing the area that the femoral component will be countersunk in the anterior femur.

Exactly. This is my two. Now I like to cut the posterior first because I like the jig to be as stable as possible when I make this important cut. He’s pulling the MCL out of the way. Put those on reverse when you take it out. There we go.

Okay. So we have taken out all the cuts for the femoral component. This was a size four component, Jack.

This was a size three.

Size three, okay.

Because the size four was impinging on the patella femoral.

So he’s happy with this position of the femoral component. He put the cutting and drill guide in place. He drilled the holes for the implant, and then he made the cuts for the implant. Now he can put the trial in to see how it’s going to sit.

You can see it's nicely parallel in the femoral condyle. It's just slightly central, as we like to have. It's got a nice flush fit. Now I’ll go back to the seven inflection. I really didn't have to force that in at all. It’s fitting smoothly. What I want to watch is flexion/extension, so an extension, I’m going to bring the knee down to 20 degrees. I’m just going to watch and see if I can open it up. I'm opening it up. Can you see that, I’m opening it up.

Yeah, on the right camera we can see that excellent.

Yeah. I would say at two millimeters, and I think that’s sort of consensus. And when we bring it up, it stayed seated. It's not rocking around, so it’s a nice stable construct. So I like those sizes. So now I can go ahead and order final components. So I go to that extra step of actually putting the femoral trial on, and I’m taking it all. And you know, that’s adding one step, but I think doing the balance is important.

I need to take out the meniscus. So I just got through doing a meniscus transplant yesterday. Now I’m taking out the meniscus today. Kind of schizophrenic. I think it’s important to get the entire meniscus so that it doesn’t interfere with your component placement.

And you just resect that at the vascular junction.

Yeah, with special care in the MCL, not to harm the MCL. We want to stay away from the MCL at all times. Okay.

How do you assess for osteophytes in the posterior femoral condyle?

Doing just what I did. I turned around and look first. Let me have a curette. So I look first, and then second, I just put a curette and feel for them. And radiographically and clinically she doesn’t have them, so that’s good. Where’s your retractor.
And is the femoral component to line right up to the cartilage where it would attach to the posterior condyle? It should be line to line where it ends; correct?

Yes. Obviously the articular -- let me have a knife. Pick up. The articular cartilage is going to be about two, two-and-a-half millimeters back there, so your component will be matching up with the articular cartilage. So your component can be exactly where you want it, and it will still appear to be, you know, maybe two millimeters proud. But that’s, again, matching up to the cartilage. Not to the bone.

Correct.

This is our tibial jig. Put this in. Let me have the sagittal saw. We just have a little residual here. Oh, that light’s by the -- I guess we have the option. We just have a little residual. Okay. Give me a curette. What I was going to try to do is use the sagittal saw on this L cut. There’s just a little residual bone here, and it’s keeping my jig coming up flush with the wall of my L cut. Mallet. Okay. Okay. This is going in fine. All right. That’s fine.

This is just a little retractor. I don’t know if you can see it. It’s like a lamina spreader, but it has little hooks. And the hooks, well actually spikes will actually going into the bone and into the jig. And what I’m looking for, I want this to be just flush. Can you appreciate that it’s flush there to the side?

You want it out to the cortical rim?

Yes. Is this on? There. I’ll be done with it this time. What I’m going to use is a sagittal saw just to help. This is a keel cut. And just to help -- this lady, her bone is not that hard but just as a routine -- now you can put that back on -- as a routine to get into, we use that saw because a lot of times it’s really sclerotic bone there.

Again, now to remind the audience that if you have questions to hit the “Ask a question” button and forward those on. We’ll take those live and reply with an answer as soon as we can get them.

So this keel spacer, it’s not to be impacted other than just a small little tap. We don’t want to propagate anything. So the implant has a keel and a lug for fixation.

Yes.

And you’ve prepared those spots.

Okay. So now we’re done with this aspect. Okay. Now let me have the femoral trial and the tibial trial. Okay. So I’m going to leave those in while I now turn to -- I can take the tibia out as I need. I’m going to go to the trochlea. Let me have the other viscid. There we go. So I have the patella not everted but I have it subluxed. I think I’m going to remove some of this synovium and fat just proximal to the trochlea, and the reason I’m doing that, this particular component extends one centimeter more proximal than a normal.

So these were components are based on some anthropomorphic data, and it extends one centimeter proximal to that. And the purpose of that is there are some patients with subtle or minor amounts of relative patella alta. So they may be as classic patella alta, but they may extend just enough that if you put a standard trochlear component in that your patella button may not be captured or engaged or at least in contact with the trochlear component, and then the patient will sense it engaging, and they do not like that at all.

Do you take out any fat fat padding inferiorly.
Inferiorly, just for visualization.

Okay.

Now what I’m looking at now is the roof of the notch, and there’s the roof of the notch. And I want to be two millimeters above the roof of the notch, so I’m setting this -- this is a step guide, just like you might do for entrance for a femoral rod, but in this case we’re making sure it’s two-millimeters above the roof of the notch.

I check for osteophytes. You don’t want to get confused and put this actually on an osteophyte or it will have you crowd. Now I’m flush with the articular cartilage. Let me just going to trim up some of this elevated. So you can see here is the roof of the notch. I don’t know how well it is coming across.

We can see a little remnant of cartilage and bone that is beneath the drill hole. Is ha what you’re trying to leave?

Yeah. That’s just two millimeters. Let me have some trials. So I’m going to use a three here. We’re going to start off with that. Okay. Let me see a two and a four. So I like to go -- so what we’re trying to match is the natural J curve of the patient and also respect ML width. That was a three. This is a two. That’s not even matching her normal trochlea, so she’s not a two. Here is a four. The four is really wider, so this particular patient looks like three is going to be the best fit. And then we’ll now use that measurement for the jig number one.

And how do you judge rotation of that component?

Okay. In this patient, she has intact trochlear margins so she’s not dysplastic. So what I’m going to do is set my initial position. So I’m going to do this in steps. Step number one is flexion/extension, and this is going to be set now. You want to make sure that doesn’t go in too tight because it can actually pull it down and make everything deeper. So now I’ve got my foot on my distal femur.

Now we have to set -- varus valgus is set somewhat by this distal cartilage and by the width of the component.

Uh-huh. And then rotation -- as you know, this is very controversial because you can’t really feel the epicondyle, so maybe you could use white-sized line. Jess Lonner [PH] likes to use that. I was just as a meeting with him this weekend. And for these people who have normal trochleas, what I like to do is put this component in so it’s respecting the natural anatomy.

So you’re trying to center that trochlear implant on the patient’s trochlea?

Yes. I’m going to go ahead and put this pin and, and I’m going to show you again what I did with that osteotome, and if I don’t like it I’ll take it out. So this osteotome is where the final implant will be. So this implant would be at the level just below the articular cartilage on this side, and on this side it’s going to be level with the articular cartilage. Does that show up at all?

Yes. Yeah, I can see that on the camera.

There is actually a reference line, and that could be put perpendicular to a white-size line as another option. So you have a couple different ways of checking and rechecking. So these -- I’ll get my head out of the way for the other side. So this is using the concept of an inlay. On this particular implant you can use it either inlay or onlay. Certainly if you have a dysplastic, it’s going to automatically going to be onlay because there won’t be any tissue.
Okay. So we have a couple of questions I’m going to answer. One is “What makes the uni-compartment tibia component to loosen or shift?” And I assume that means why does a tibial component on a tibial uni-condylar come loose? And the answer, from my perspective, is if the component has been put in poorly, such as a cemented implant that is not really well cemented, that certainly puts it at risk. More important to me is the kinematics. And if the femoral component is crossing over the midline of the tibial implant and rotating back and forth, it can cause a rocking on the tibia, and that can certainly stimulate a loosening event from a cantilever onto the tibial implant. That would be another cause of loosening. Polyethylene wear are certainly other issues can cause bone resorption or loosening of that implant. But it generally has to do with the mechanics around the uni-compartmental and the quality of fixation that is achieved at the time of implantation.

The next question that we have regarding how long it is expected that this prosthesis will maintain fixation? I assume that implies both the patella-femoral and the uni-compartmental. Would there be any problems if the physician decided to perform a total knee replacement within a few years later? And from my own perspective, having revised uni-compartmental to total knee replacement, I can say that’s absolutely not a problem revising a uni-compartmental to the total.

The patella/femoral replacements, I have revised from a patella femoral to a total, and that generally is not a problem either. And I wouldn’t anticipate that a bi-compartmental of this nature would create any problems as well. Jack, do you have a feel for that?

I think it’s just basically two implants and what you said I would agree with, it just happens to be in the same patient. The challenge I would see would be identifying the epicondylar access or your access for rotation since you lose some of the bony landmarks, particularly with a bicondylar replacement or bi-compartmental replacement. So there may be some issues with femoral rotation that you may be best served with a balanced -- flexion balanced technique. That would be my advice if I was going to revise a knee such as this.

This is just a jig that I’m putting on. It’s matching the backside contour. There’s usually a of cartilage in the distal aspect, much more so than on top, and any time it’s going to hit the cartilage, it’s going to want to jump. So I kind of go slowly. I’m going into the cartilage first. Now I’ve got that removed. I’m just going to come around, again, trying to make sure that I’m flat on the rails. I’m riding the rails around.

So that’s a router. And if you stay on the rails, will it do complete preparation?

It may in larger ones. The central area may just have just a little touch up. But you’ll have a good idea exactly the depth that you should be. I’ll just clean this up. The router does an excellent job on bone, and it tends to just peel back the cartilage a little bit at times, so I’m basically just cleaning up the margins.

So when you envision inlaying this prosthesis onto the trochlea, would you like to see the metal coplanar with the articular surface a little proud or a little countersunk? Which would your preference be?

Okay. There’s an order of preference, so the patella is tracking lateral to central. So if I’m going around, I want to make sure the lateral is either flush or slightly inset, and you can see that I have a -- I don’t know -- can you see the osteotome resting on the metal?

Yes. The right camera shows that very well.

And so I’m flush right there. I’m a little recessed distally. I’m flush over here on the medial side. And up here you can see I’m flush with the bone and maybe one-millimeter sunk, and that’s how I would like it. And we have it centered. What’s nice about this is we know right away having an inset that we’re not going to have soft tissue impingement laterally, which has been a problem
with some wider implants. I use the distal one first because I think this is the most important. And next time I'm going to use it clockwise, and it will be a little faster. There we go. Now we just take those out.

These little pins are just to keep the jig in place. Now I will do either an inset or onset patella. In this case the patella has panpatellar involvement, so I have a tendency to resurface the entire patella. If it has maybe just lateral facet wear. Knife. Retract right there.

What I'm going to do is nothing unique to patella for arthroplasty. So this is just cleaning away synovium and fat so that I can see the attachment sites of the quad and patellar tendon. Those are going to be my references, and then our goal is to not overstuff, and certainly we don't want to go below 12. Some patients in patella-femorals, especially the dysplastics, they may wear down their lateral facet to ten millimeters or so. I think there are several options there, but one is to downsize the patella possibly and just not even incorporate that 10 millimeter.

Or, Dave, you described kind of a little rebar effect for difficult patellas. You want to talk about that?

Yeah, if there's a big defect in the patella from a cyst or in a revision situation, certainly, I have used threaded K wires to strengthen the patella. They help to fix the prosthesis to the bone. They help to strengthen the bone and prevent migration or loosening. That's one technique.

So your resection here, Larry, pretty healthy patella. No bony deficiencies. So you're going to make a resection that is going to go just beneath the facets medial and lateral. Is that your goal?

Say that again. What I did was ask her for the wider saw. She was giving the uni saw. This saw is just a little bit easier to use for patella cut.

So your landmarks are going to be your quadriceps and patella tendon up top and bottom.

Right.

And then your medial and lateral facets, you just want to get beneath those and leave a residual thickness of certainly at least 12 millimeters.

Yeah. And in hers, I'm going to put an 8-millimeter thick poly, so she measures 23, so I can go up to 15 and won't overstuff her.

Okay.

Her lateral facet feels like it's probably close to that size, so my goal is to be to start here medially and then come out laterally almost even. So you can see I'm taking almost no bone off the lateral facet. It is pretty hard, so I want to have my -- so we'll measure this, and you can see it's 15, maybe 15-and-a-half, and if I go through it with another cut, I'm going to take off more than a half. If I feel it though, she's like I thought. She's 13 laterally, and she's 15. So I am going to take a little bit more medially, because I would like to have it flat across. Just checking for flatness. Now I'm down to 14, and I think this is where, you know, the enemy of better is good or whatever that is.

So you would not anticipate, based on her anatomy and prior patella tracking any need to do a lateral release or any other procedures in this case?

Yeah. What I'm going to do is what they call a "recession," where I'm just going to elevate the periosteum from the lateral aspect. So, yes, it's not a release. But you can see I've actually medialized my component by about four millimeters. Saw. And I'm going to take that, and that was where it was a little thinner also.
Okay. You're just beveling it that down on the lateral facet it looks like.

Exactly. I don't want to have crowd bone.

Okay.

Now what I'm doing is just what I was talking about is just releasing the fibers from the patella. So I'm not actual lid cutting through them.

Right. You're releasing the synovium off the patella, yeah.

Exactly. That's all. And now what we can do is put our trial on. There's a question here that describes the -- that says that the patella-femoral joint looks like some older designs that some other companies may have deviated from. Most of the modern designs have a broader anterior flange and could you comment on this.

Yeah. The broader anterior flange, which I would call -- some of those if you -- it depends upon what you're looking at as new. Some of the other components, if you put these up next to it, it's going to look very similar to it. This actually has -- you can see a line here that I just popped off. Can you zoom in on this line so I can show them.

We can see it. So this line is actually -- and it varies by the size of the patient and the size of the component -- it's going to have approximately a 10-degree angle, so it's going lateral from medial. So what this does, it's a sided component. So if you had like an earlier unsided or a symmetrical component, they also understood that you had a lateral to central type of tracking, but you would have to have that going on on the other side at the same time. So we're actually able to have a narrower component because it's sided and yet still have that advantage of lateral to central tracking. So that's sort of the 30-second spiel.

So because of the low point on the trochlea, it allows it to deviate to the outside, to the lateral side to capture the patella when it flexes.

Yeah. And this is a no-thumbs test, and she's tracking centrally. But she's not going lump -- or there's not any clicks or clunks or deviations. It was nice and smooth, so that's acceptable too. Now what I'm going to do is put these in in stages. I'm going to put the uni in first and let the cement cure, and then I'll put the patella-femoral in and let the cement cure.

Okay. What I'm doing now is just standard for all arthroplasties. I want to have a really good cement/bone interface.

You're drilling the hard bone in the tibia?

Yeah.

Okay. Yeah, there were some questions about loosening of the tibial components, and I think with a fixed bearing implant, that's not -- in my experience has not be a major problem unless there has been mismatch of the component femoral-to-tibial implant that leads to edge loading or other problems. With mobile bearings it could be a little bit more difficult on the implant if you have kinematic mismatch.

Yeah. And the engineers did quite a bit of finite element analysis looking at this, and that's why we added that one little peg so you wouldn't have rocking.

Right.
I’m just going to check my components here. Great. So he just showed me those inserts. So I’ve done about 50 of these, and in comparison to a prior uni, I think most uni users will see, you know, early failures and late failures. We think early failures are probably a combination of the surgeon and implant and the patient, and the late failures are probably more just biology I think. But we’re not seeing those early failures with this component, so that’s nice to see.

Yes. I think the addition of a peg certainly gives you a little margin of error if you don’t have absolute correct tracking of the implants. But I agree that the early failures are usually technical. Technically either not correctly tracking the femoral on the tibial component, or it may have been the cement technique that was utilized, or it could be in balancing. If the knee is not balanced then there is going to be overload, either in flexion or extension, and that can certainly lead to a disruption of forces across the fixation, and that can lead to early failure by loosening or it can lead to fracture of the tibial metaphysis that could lead to problems with the implant fixation.

Yeah, we can see all of our pins are sort of mostly in the central aspect. We don’t have any pins going underneath.

Yeah. That’s an important for the uni-condylar portion is not to put pins beneath the tibial bearing through the tibia anterior to fix your cutting guide. I certainly would avoid that.

So this posterior cut, as opposed to a lot of them which are at 90, this is at 105, so as a result, it’s important that we flex this knee to be able to come in at that parallel.

You’re talking about the posterior condylar section is not 90 degrees.

Yes.

It’s 105 degrees.

Yeah. Yeah.

So you have to flex the knee in order to put the femoral component on, and therefore, do you recommend putting the tibia down, and then the femoral component, and then the bearing in?

Yes.

Okay.

And then the bearing sometimes in some knees it’s easier in flexion and sometimes it’s easier in maybe 20-degree flexion where you can open up the MCL.

Another question about how long a bi-compartmental knee replacement can last after the surgery. And I guess from my perspective, having done uni-compartmentals now for 20 years, I’ve got many of these knees that I put in 20 years ago that are still functioning well. The problems that we do see are typically between 10 and 15 years, we’re seeing polyethylene wear. My 12 to 15-year results had an 8 percent reoperation rate, with half of those reoperations for polyethylene failure, and those were changed with bearing exchange. Half of them were either for development of arthritis in the opposite compartments, or loosening, requiring revision. And that’s pretty good, I think.

So I don’t know why a patella-femoral and a uni would not last as long, providing technical parts of the procedure are done correctly and the tracking is good, there’s kinematics. And the advantages I see for this are that you’re preserving anterior cruciate and posterior cruciate ligaments, and if the lateral compartment is truly normal within a normal lateral meniscus and you balance the knee, it would could last you 20 years if the polyethylene will last that long.
The Europeans have been doing bi-compartmentals all along, and I think Argenson recently presented the Knee Society his long-term follow ups, and they mimicked just what you said, Dave.

Yeah. Yeah. It really comes down to material properties of the polyethylene, which are hopefully butter than they were 20 years. And the technical aspect of doing the procedures, I think the instrumentation is better. The one thing that we through into the mix was minimally-invasive procedures, and certainly there is a learning curve to try to do these surgeries through smaller incisions. And I’m glad to see you made a big one for this, because I’m sure you can see very well.

Yeah. What this allows me to do, obviously, with all trade components, I can come back to the back and clear out any cement.

Yeah, that tibial tray is very nice. I agree.

Keep it up there.

Now is there any concern about the gap between the components? Because there’s going to a bridge of bone and maybe some cartilage between the two, is there worry about what might happen to that?

It hasn’t historically, and we’re not seeing anything clinically so. Got just a little cement there. Curette. I don’t know if you can hear that pop over the whine of my -- so we’re now putting the knee into extension, and I just like for the cement not to see motion while I’m letting it cure. So this could be the longest part of the case here. It depends on how cold this room is. What’s our tourniquet time?

We’re at 50.

So we’re at 59 minutes. Let me have a Rongeur. So I know you could have probably done two totals at this time, Dave.

Yeah, I’d be taking a coffee break after my second right now, but that’s already.

Got to have somebody pushing the envelope.

So would you normally cement all components at once or both?

You know, it depends on how this -- sort of the morphology of the thigh and if you have something you can get to, everything quickly you can see everything. I just want to have my components in and not be moving things while I’m doing the trochlea.

Right.

So, yeah, the majority of times, I will.

So we’re mixing a second batch of cement right now. Is that what we’re doing?

Yes.

Okay.

Other than that, we’re just looking at each other.
Now the rehab of these patients, will you do anything different with this patient other than, say, a total knee?

Well these rehab are like a uni-compartmental, so I mean the emphasis is the same as with a total. I mean you want to get early muscle strength, and you want to early range of motion. I think these patients have the potential of certainly less blood loss. There is some degree of less soft tissue stripping. And I think if you had three patients, a uni-compartmental, a bi-compartmental, and a total, the bi-compartmentals are going to act closer to a uni-compartmental or a patella-femoral arthroplasty than a total knee.

And is that because you think because you say the cruciate ligaments and the kinematics are a little bit easier?

You know, so I really only violated or touched or irritated the capsule one-third of the way around. I mean, you know, we have a tendency to think of a uni as a half of a total, but it’s really a third of a total, so we have left the cruciates. We haven’t touched any of the lateral capsular attachments. We’re not getting into that little bleeder over near the popliteus or the superior/lateral geniculate.

And your joint line should be pretty close to where it started.

Yes.

So the kinematics in the collateral ligaments should be reasonably close, and we think that would advance motion.

The kinematics of the femoral motion should be dead on, and if you reestablish the joint height, the same thing for a uni-compartmental. There’s a question about are there any tricks to get the polyethylene into the tibial implant, because it looked like you were struggling there a bit, but it looked like you had the knee flexed up quite a bit, and that may have caused an issue. If the knee is at 90 degrees, it should slide right in without any problems; correct?

I didn’t hear the last part, but like I said earlier, if you’re having trouble in one or the other, typically it’s harder in flexion than going into extension. I thought I could get out of the way a little bit easier. Plus it’s always nice to see me struggle. But then to another comment on that, I’ve got bone-on-bone CMC bone arthritis, and my thumbs I can’t --

I thought that was your thumb that popped. I don’t know it was the polyethylene.

Yeah, that was my thumb that popped. That’s right. Exactly. I’m just going to change gloves.

Yeah, I think the answer to that question is that the easiest position is probably 90 degrees of flexion to snap in the polyethylene. If you need to extend it a little bit, that might give you a little bit more laxity, but it’s really not hard. It slips right in. You can feel it click in, and it’s secure after that.

So this lady has had this under femoral and sciatic nerve regional blocks. We went back and forth. Are you using pumps at all on your femoral and sciatic?

No.

I’m not either.

No, we’re not using the pump. We’re just doing single-shot Ropivocaine blocks.
Yeah, when I had my total neat done, that’s what I had. About 18 hours of no pain at all.

So you’re a proponent of a single-shot block?

I am, yeah. And you don’t have them leaking and calling about leakage. And some people, there’s a small number, but I think they almost get -- I don’t know -- addicted is kind of a strong word. But they get so used to not having any pain, when they have just a little bit of pain, they go “Can I have a little extension? Can I have 24 more hours of block?” And you have to kind of go through some type of realistic pain and get onto the next step.

Any encapsular injections that you do, or just the block?

I just do the block. I know a lot of people love those injections.

CPM or non?

A lot of it insurance companies in Indiana don’t pay for CPM, so that’s one thing. Number two, you know, just down the road I think several years ago, Merrill showed that several weeks down the road, CPM is not going to be advantageous. So I have a tendency not to use CPM, unless somebody has had prior surgeries, and I feel that they’re, you know, at high risk for developing excessive scar tissue.

Okay. Weight bearing, tomorrow she’s be walking. You know, we go back and forth on that, and I think it was the prior implant, I was just a little weary of early, early weight bearing. And so obviously for totals, just like everyone else, they’re up walking the next day. On these, they’re up walking foot flat. But I’m trying to let the bone have maybe a little bit more time to maybe re-accommodate, so I’m keeping these patients on crutches for two weeks.

Is that for the uni-compartmental part or the patella-femoral part?

That’s for the uni. The patella femoral they can walk full weight bearing immediately. So do you protect all uni-compartmental for two weeks?

I’m doing that right now. We just had -- the designs surgeons sort of had a little huddle, and it kind of goes across more boards. Some people are more conservative than I am and some people are full weight bearing the next day, so I guess I would rather find out that I’m being too conservative than the other direction.

Yeah, I don’t know the answer. I’ve always been full weight bearing out of the gate the day of the surgery, next day, whatever.

Well your results are at 15 to 20 years, so I think I’d probably go with yours more than mine then.

Well I’m just wondering about the concerns. I don’t know. I’m not sure about the answer for that. And the question came in is “When will this patient go home?”

This will be a 23-hour stay., so they’ll go home tomorrow.

So this patient’s going to go home tomorrow. That’s pretty typical for your uni’s, or you do those as outpatients?

They’re classified by insurance as outpatient, but I keep them in for 23 hours. That’s to make sure that they’re doing well; that if they do need pain medication, there’s a nurse there to give it. And then I like to give that 24 hours of antibiotics in them.

Okay. So a couple doses of antibiotics.
Yeah. And then you can let them go home with home physical therapy or outpatient therapy, or how do you manage the rehab after they leave?

The total joints all have therapists go to their homes. These, it’s a little bit more on a case-by-case basis. Because I’m doing a lot of these on younger individuals, and a lot of them are fairly active, and they like the exercise, so I just give them a home exercise program.

So is there a -- what are the educations for doing this operation for you?

I think most common would be tibial-femoral degenerative disease, with patella-femoral pain and patella-femoral chondrosis. So they’ve got to have both. If they have no patella-femoral degenerative change, then I think they probably wait and maybe find out why they’re having patella-femoral pain.

And then, you know, a rarer subset is going to be like this person who actually was having significant degenerative changes at both sites. And then the last subset will be the patient who has patella-femoral dysplasia and actually has tibial-femoral degenerative changes. Those people probably have, you know, marked tibial-femoral access malalignment.

Is there an age range for this patient for this type of procedure you want to see?

You know, this is probably the upper age range. I mean I think the majority of my partners are going to see this and say, “Why are you doing this when you could have already had a total in the person.” But, you know, I don’t know of any totals that are going to last this person until she’s 90 or 85. You know, she’s 54.

So you think it will be a more conservative second surgery than a bigger rescission.

Yeah, that’s my hope. That’s the logic, yes.

Okay.

Just like us doing a bridging surgery with a uni.

Now in Scandinavian countries they kind of ignore the patella-femora joint and just do a uni-compartmental replacement. I don’t know the answer to that, so when I do a uni, I do accept a fair amount of femoral wear. So the real question is going to be, will this perform better in that particular population than just a uni-compartmental than just a uni-compartmental, with leaving the patella as is.

Well I think you’re right on. I think it has more to do with the patient’s symptoms than it does what the patella-femora joint looks like. I mean we have all seen people with horrible radiographs and they have no pain whatsoever, and vice versa.

Right. I think there’s, you know, a combination. Do they have symptoms? What are they going to be able to tolerate post operatively? And I actually have that discussion with them because, you know, this takes longer. It is more invasive. If I could have just done a uni on this patient, I would have. She had significant pain with steps, and it was not anterior-medial like a typical anterior-medial uni, but I mean direct retinal patella. So I felt uncomfortable. I thought that -- my decision on her was either do a total knee arthroplasty or this procedure, not a uni.

Yeah, I agree. I could see that. Okay. And the question is, “Do you offer mobile-bearing tibial implant?” The answer is, “Yes, they have mobile bearing total knees.” There is, I guess, a mobile bearing preservation tibial implant for uni-compartmental, but the total knee is what’s been most studied and has the most literature on it. Do you take -- on the tibial resection level, Jack --
Yes.

--do you take two millimeters off the affected side? Is that typically what you do, or does that vary on patient to patient?

You know, that’s a real good question because what we want to do is that two millimeters is not how much we’re resecting so much, as that two millimeters on the low aspect of it, and I also showed that I was taking eight millimeters on the high side. Because as we know, that’s a wedge shape. So my real goal is to be able to take the bone out, put my seven-millimeter spacer in, and get it in snugly. So that means I’m actually keeping the joint line where it is. So I’m not going so much on you, you know, saying two millimeters, because it’s only two millimeters at the most medial aspect. Does that make sense?

Yeah. My comments on that is you’ll see a lot of uni-compartmental knees you’ll see different wear patterns, and sometimes the wear is mostly on the femoral side and sometimes there’s a fair amount of wear on the tibia, and basically what I’m thinking of is where was the joint line before the joint became diseased, and I’m trying to put it back in that position. So if I’m going to use a 7-mil implant, I’m going to make it down to where it’s a 7-millimeter cut. If it’s an 8-millimeter or 9.5 millimeter implant, I’m going to make a little lower cut. So those are the things I’m thinking, and it really depends on how much wear there is on the tibia.

And the true test is to make your cut and then do the trial with the femoral -- with the femur untouched. So inflexion, you test it in the flexion, and you test it in extension, and then you’ve got to figure out where the joint line’s got to go in between.

I agree fully.

Okay. “Does a metal curette risk scratching the bearing surface? Would a plastic curette be better for removing the cement?” Was that a curette that you were using?

That was an angled curette, and I went behind the component.

Yeah.

I didn’t put it on the face of the component.

Well the reality is, on the edges of the component, it’s not a bearing surface anyway. I typically use a dental instrument that’s got a little flat shovel face that scrapes right along the side of the implants.

I’ll request yours next time I’m up here.

It’s here.

Can I have Dave’s instruments.

“Is there an age cut off for uni’s versus totals.” In my practice, really there is not. I have done uni’s on 80-year-olds and 85-year-olds and I’ve done uni’s on 25-year-olds. The big impact on my practice in the elderly has been in the patients over 70, who I used to do total knees on everyone. Now doing uni-compartmentals on people who are otherwise candidates for a uni. The big difference is on the recovery. They recover so much faster with a lot less physiologic impact. They require less narcotics for pain management. They get their function back quicker. And when they walk in at six weeks, they are totally different than the total-knee population in my experience. So I’m very excited on using uni-compartmentals in the elderly as a great operation.
Contrary to that is the younger patient, 40 to 50, who has primarily medial-compartment or lateral-compartment arthrosis, and you do a uni-compartmental on that patient, it’s still a very quick recovery. I do allow them to get back to some active sports and activities, and I find that the activity level on the partial knee or the uni-compartmental is still much higher than the total knee population. You think so, Jack?

I couldn’t agree more. In fact, that’s in the literature. And part of that, they really like to have that sensation of more normal kinematics. I’m just writing an article on sports after arthroplasty though, and I think the big key is even though they can play those sports is that poly wear is our main enemy with these joints. And poly wear is linear to the number of steps you take, but it’s exponential with the amount of load you put on it. So I’m certainly am not going to let one of these go back to playing basketball or singles tennis.

Yeah.

But if they want to, you know, maintain their cardiovascular fitness by walking, and then every now and then play doubles tennis, or if they were an expert skier before, then I think those things make sense. It’s all a give-and-take risk-reward ratio.

Yeah, I agree. With have an active population that wants to stay active. And that’s part of our duty to try and accomplish that but within reason, and that’s what we do. For the total versus the uni-compartmental replacements, the other study that we’ve just had published, Dave Delury and I, on a series of uni-compartmentals and totals in patients, comparing the two. By about 75 percent, I think the uni’s were preferable to the total in patients who had one of each. So I think there is a fair amount to be said for isolated replacement in these cases that have otherwise normal ligaments.

Yeah. The big question is what do you do with a patient who is ACL deficient and is it ACL deficiency, or ACL patholaxity, or is it instability? What are your thoughts, Dave?

Well, for a patient with an ACL deficient knee and a medial compartment arthritis, I’m really interested in the function. Do they shift? Do they give out and buckle? Or is it just the pain, and is it something that still can be repaired with a uni-compartmental? And I think most of the time I’ve done patients with an ACL deficiency reluctantly with a uni. But I have done a few, and it worked out well. I have also done an ACL reconstruction simultaneous with the uni, which I think you’ve done a few of those.

Uh-huh.

And I think those patients do very well. But those patients have gross instability, plus a shift, and they really, really need to have a ligament reconstruction or a total knee, in my opinion.

I couldn’t agree more. I really don’t like to do the ACL. I mean I like to do ACLs, but I just don’t like to do them in congress junction. It just makes me more nervous. In fact, I’ve gotten to the point where I don’t put my tunnel where I typically would in a normal ACL. I put my tunnel coming in from anterior/lateral on the tibia. So as we know the femoral side is more important from an anatomic consideration, so that’s -- I just don’t want to put my tunnel under my tibial plateau.

Your results with those patients has been good?

They’re been like a uni.

Yeah.

So I haven’t seen -- they’re not superior, but they’re not inferior.
Very good. We'll see if there's other questions that are coming up. I think we have addressed most of the ones that have been faxed. I've got a stack of them here. And you're seeing these patients back at how soon? Six weeks?

So we'll see them every two weeks.

Every two weeks you're following them?

Yes. You can let the tourniquet down now. So what was the tourniquet time?

70 minutes.

70 minutes is the tourniquet time, so, you know.

So the tourniquet came down after you closed everything up.

Yeah.

And I didn't see if you put a drain in there or not.

No. I don't use drains.

No drains. Okay.

So you could have been having coffee after your second total but not having this much fun though, see.

No, that's right. Okay. Well I think that we're about done with this procedure. I hope it's been enjoyable for the audience. It certainly has been for me. Questions that can be addressed, I think, can be sent on to Depuy as the sponsor. We appreciate their support in putting on this conference, and thank you for joining at the Indiana Orthopedic Hospital. Thank you.

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