Sigma® Total Knee Replacement Utilizing the TruMatch™ Personalized Solutions System

Anderson Orthopaedic Clinic
Alexandria, VA
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Welcome to this OR Live webcast presentation brought to you by DePuy Orthopaedics, a Johnson & Johnson Company.

Hello and welcome to this live event featuring a total knee replacement done with the TruMatch Personalized Solutions System from DePuy Orthopaedics. I'm Dr. Mark Pagnano and I'll moderate this event and I'm joined by Dr. Andy Engh and his surgical staff. We're coming to you from the Anderson Orthopaedic Clinic in affiliation with the Inova Joint Replacement Center at Mount Vernon Hospital in Alexandria, Virginia. Dr. Engh and I recognize that our audience tonight includes both patients and surgeons, and this presentation is designed to address the needs of both groups. As a reminder we will be able to answer questions later in the program. For those of you who are viewing us live, just click on your screen the Ask a Questions button to submit those questions.

If we go to the slides now we can introduce this patient and their radiographic findings. This patient is a sixty-nine-year-old female. Height is five foot three inches. Weight is one hundred fifty-five pounds with a good range of motion from zero to one hundred twenty degrees. The patient has substantial pain now on a daily basis that interferes with her activities of daily living. She's failed a comprehensive non-operative course of treatment for her knee pain, and she's ready to proceed with a total knee replacement. She did have her left knee replaced in 2006 and that's working quite well.

By way of introduction, we'll look at some of the potential advantages of this TruMatch Personalized Solutions System. The key advantages that we see for this solution is that it allows first a detailed pre-operative planning process to allow the surgeon to be engaged in figuring out the best way to address an individual patient's arthritic knee problem. The cutting blocks that are designed with this system include an integrated soft cutting guide that's metal and pin guides that are captured to allow precise positioning of the blocks during surgery. The imaging that's used to develop this system is based on CT scans of the patient's hip, knee and ankle, and this allows the most detailed view of the patient's boney anatomy and we think allows the most precise blocks that can be produced. The alignment of the limb after surgery is designed to correspond with the mechanical axis which has a proven track record for several generations of total knee designs. These cutting guides are packaged in sterile packaging so they can be opened directly in the operating room and don't require secondary sterilization at the hospital. And they're compatible with the full line of DePuy's Sigma knee system.

The experience for patients and surgeons in utilizing the TruMatch technology involves this process that's outlined on the slide. First the patient and surgeon decide that they're going to pursue the TruMatch Personalized Solution and submit the case online. Second, the patient goes for CT scan imaging at a CT center near their home, and the images are then sent to DePuy Orthopaedics where the images are processed to make a detailed three dimensional model of the patient’s knee. After that model has been developed a patient proposal is sent to the surgeon and the surgeon has the opportunity to review that surgical plan and make modifications as necessary so that the appropriate cutting guides will be manufactured. The guides are then built at the factory, sterilized and shipped to the hospital prior to surgery. The guides can then be opened from their sterile packages directly in the operating room and used in the surgical procedure.

If we look at some of the efficiency advantages of this system, on the left-hand side of this slide are the conventional instruments that we would use as surgeons to carry out a total knee replacement on the thigh-bone...
side of the joint. And on the right-hand side of the slide are the three steps that are required for the TruMatch process. So it’s very clear to see that there’s substantial efficiency gains that can be made with these TruMatch blocks as opposed to the conventional. With the conventional we have at least eight steps that need to be completed before we can finish the thigh bone or femoral side of the knee joint, whereas with the TruMatch process it’s a simple three-step process.

Similarly, on the tibial side, or the leg-bone side of the knee replacement, we have at least five steps that need to be done with the conventional instruments, and again, the three-step process with the TruMatch system.

At this point I’d like to turn it over to Dr. Engh and allow him to introduce his operating room staff prior to starting the procedure.

Mark, thank you very much for that introduction. I’d like to recognize my staff which stayed here tonight. We have two circulating nurses in the room with long experience. Over here to my right Nancy Hensen and Debbie Stuart and I’m going to ask Linda to turn around. Linda’s my scrub technician who’s been working with me for the full time of my practice. Bob Fontana is my PA, also has been working with me as long as I’ve been in practice. Dr. John Gainor, and he is my fellow, and then Dr. Win [sp] is my anesthesiologist. So we’ll go ahead and begin the surgery now. It’s the right leg for this patient. We’ve had the tourniquet up just briefly, and we want the audience to have a chance to see not only the advantages of TruMatch but also to see a total knee replacement.

I use a fairly typical incision right along the border of the quadrates tendon, trying not to get into the quadrates tendon as much as possible. You can see the vastus medialis muscle, and then go ahead and mark the extensor magnism [sp], that’s for my repair at the end of the procedure. We may get a little bit of fluid from the joint here. So we’ll finish up off here. Then we’ll bring the leg down. We have a loose body, which is not uncommon in an arthritic knee. Some people would call that a joint mouse. Others will call it a little pearl. And I’m pulling the kneecap over to the side so I can get to the outside of the knee here at the start. And then we’ll come and – this is a typical exposure. I try not to use my cautery here if I can because I like to maintain this sleeve of tissue on the inside of the knee. I’ll try and elevate that right off the bone. Usually find a pocket around here. And once I’ve got a little bit of tension I can use the, what we call cautery to work my way around the inside of the knee. There we go. Got a little release on the meniscus. Come down a little more here. Now we go and we can maybe flex a little bit. There we go. That’s a start for us. Then we’ll come over here. This is what we would call the patella femoral ligaments which will make it easy for me to move the patella to the side.

One thing with the TruMatch System is this soft tissue here, the block, the femoral block that will go on needs to be able to get in contact with the patient’s bone and because the model is based on CT and the CT sees the bone, so I’ve always done this exposure of the synovium here. I don’t typically take any out. I just let it lay back in place. The other reason to come up here a bit is it makes it easier to see my saw blade when I’m making the anterior cut and I can ensure that the saw blade is not going to come out of the bone. Now we’ll take the knee up and work to get our retractors in place so I’ll take a little bit on the lateral side of the knee, take out part of what’s called the lateral meniscus. Part of the TruMatch System involves the surgeon making an estimate of how much cartilage is remaining and because it’s a CT-based system, the CT can’t see the cartilage and so we rely on the surgeon, and in this case I estimated that there was a hundred percent loss of the cartilage on the medial side of the knee and as you can probably hear, that’s hard bone, that’s not cartilage as opposed to cartilage on the other side. And I estimated about a fifty percent loss of cartilage on the distal part of the femur, so I believe my estimates were correct. For prospective patients or non-surgeons this is what’s called the anterior cruciate ligament. The particular knee design that I’m going to use today will not require these ligaments. The implant will actually substitute for those ligaments, so I’ll go ahead and take them out now while I can see them. There are different designs of knees and some will keep the posterior cruciate and some will not.

If you’re the light hearted now you, this is where we actually, this is what we call sublux the knee forward. And I can get a little more release like this. That’s probably going to do me for now. I may come a little- how am I looking on my medial ligament? I may come a little – I don’t think – I can do that later. I’m happy with that, so I think at this point I’m ready to go ahead. I’ve got a little bit of soft tissue on the front. Just like I mentioned with the femur, the guide has got to be able to sit down on bone and so I want to make sure that I don’t have soft tissue right where this guide is going to sit. I can take a little methylene blue.

So Andy I’ve noted that you’ve taken out that soft tissue as you stated, but you haven’t removed any of the osteophytes. Is it important to do anything with those osteophytes or just leave them in place?
This is different from the typical steps in a knee replacement where you remove the osteophytes. These, these blocks actually utilize the osteophytes to a certain extent to gain purchase. And as you look at the back of this block you can see areas that are cut out where the osteophytes will actually fit. One of the features of the blocks is also the cutting guide being built in and then the three fixation – it’s two of these pinholes will allow you to use your conventional instruments and go up and down. The other thing that I have done traditionally is typically mark the lateral tibial spine, and there is a line on the, on the block that I’ve gone ahead and marked in blue and that corresponds to the anterior posterior orientation. We have chosen to design these blocks about twenty degrees off axis which will make them a little bit easier to use in less invasive procedures but also gives us a surface of bone here that I’ve marked in blue, and that surface of bone will also correspond to the block. And so when I put this block on I’ll bring this line in towards that lateral plateau, and I’ve got to do a little more work over here laterally. I could probably slide that on but I’m going to get a little bit more so that I’m not, not fighting here. And so I’ll bring that block back. Make sure that I’m on bone here where I’ve marked in the blue. Get this piece. And so what I’m looking for is first to put tension in the front, and I’m going to be, let’s see. Can we get a rake down there to see maybe from, from right this side. It’s hard to see but, but this block is sitting flush on the bone right here. And on that. The light maybe is – but the idea is that I push on this and it sits good, so once I’ve pushed on that and I’ve kind of wiggled the tibia, then I put a little bit of pressure down for my varus – for my – to make sure my block’s not moving, and then with the block positioned my – let’s get that – yeah, that’s moving the whole tibia. Okay. Let’s go ahead and pin that. I will say that I think with any of these systems that probably the tibia block is the trickiest one, but I’m down on my cartilage and on my bone. I’ve got, now that we’ve got that pinned in place we may be able to show, I don’t know, can we see in, into that? Or we’ll just keep moving. Let’s go ahead and have the saw. So now we’ll take the pins out. I could, now, one, people will often want to just try and leave those pins, but these blocks actually fit so well that we have to take the pins off and so – oh, I missed my step. Let’s go ahead and do that. One thing that I will typically do for people that are just starting out is to use a drop rod. I’ve actually in my practice pretty well stopped doing that because I just, I do this at a later part in the procedure, but the system does have the ability to put a drop rod in to check the alignment. With this, now there’s a little bit of play in the drop rod but I may be in a tiny bit of varus the way this rod is placed but I’m going to rely more on the measurement of my tibial cut and my drop rod that I use later in the procedure. All right. Let’s see. Let’s mark those holes. I’d like to mark those holes right here. There and – where was that hole? Where did – I don’t think it’s there. Okay. And then let’s get the osteotome and we’ll lift this piece of tibia up. I’ve got my – and we’ll take this out. The other thing that I will typically do is the plan that was created, which we can show you later in the procedure, measures the thickness from the low spot and so right in this, in that area. And so I will take my caliper at this point and measure the thickness here on the medial side and that thickness is about nine-and-a-half and then if I add another millimeter for the thickness of the saw blade I’m about ten-and-a-half. On the lateral side right by that dot I’m about eight, so I would put that at a nine millimeter thickness cut. And so what we’ll do is we go over here on the board, on the wall, and I don’t know if they can show you that, but we’ll put nine and ten. So both of those cuts were within a millimeter of my plan for the tibia, within two millimeters. So whenever that plan is like that, I just, I keep moving on. I generally use two millimeters as my goal. When I get to three or four millimeters that’s a sign that I, I need to, to double check with my traditional techniques. I’ve got a little bit of bone left in the back that I’ll get off with the saw. So that block, in that step, I have determined the thickness of the cut, the varus valgus angle of the tibia, and I have also determined the, what’s called the slope of the tibia. Our plan was for a three, and a three does, does fit. I mean a two five. This is a two five tibia, so we’ll check and that two five is covered by the bone nicely, so the size of the tibia was correct.

And then we go right on to the femur. The femoral block generally fits very well, much better oftentimes than the tibia or at least the feel is good. The components of this block are these two pins here, which will correspond to the rotation of the femur, and then the two fixation pins above and then the cutting slot. I’m going to go ahead and see, just for the sake right now, if I can mark for the surgeons that are watching, what the epicondyles, the lateral epicondyle and the, these epicondyles are somewhat subjective, but I think most of us can make an estimate for them. An we’re not quite ready to draw the line. But then we can also draw what, what we have typically called Whiteside’s line, and then we’ll go ahead and put this block on and we’ll come back to those, those points later. So the, again, the component here that needs to be in contact with the bone will come down right up here anterior, and that block just fits and it doesn’t go anywhere else.

We’ve got – are we looking at this rotated on the camera? The camera really should be about ninety degrees rotated to where we – we’re looking at it up here, on that one? Okay. I just wanted to make sure I was – I got so many cameras in the room I’ve got to make sure the audience is seeing the right camera.

So that fits very well. There’s nowhere else that that can go. We’ll pin that. And you have to – so when I look at the fit, I look right up on the side. Now these blocks will not always fit perfectly flush, and that’s because on the
under surface there are some little pads which correspond to the area that's been removed, but this, particularly if we look over here from this side. I don't know whether we can see that. Not quite. Very quick. And then the posterior runners are fitting nicely, so all of that fits good and then I will go ahead and drill the holes for rotation. That one actually hit the pin as it typically does. All right. We’ll go ahead and start our cut. Okay, I’ll sneak up, I’ll go ahead and dance around and make that cut. Normally I would have my, Dr. Gainor do that but - . So this one pin provides a little extra, a third pin for fixation while I’m cutting the medial condyle. Ah, see, I can, that’s about as far as I can get on that one. So then we’ll put a pin back on that side. Pull that out and I’ve still got pins there for fixation. Do we have one of our, no, we got – so we’ll take that pin out there, and I’ll take the methylene blue, and I’ll mark my drill holes in case I need to come back and re-cut this. So we’ll swing around here in a moment and finish the cuts. Try not to drop these cuts because then I won’t be able to measure them. Do a little dance with my assistant and then come up – and this is the typical thickness of these cuts, so we’ll take the caliper. So the medial thickness that I get is eight plus one is nine, and the lateral is, we'll say, seven, seven plus one is eight. So we’re again within two millimeters of the, of the plan. You got those, Nancy? What did I say, eight?

Nine.

Is that what it was? Okay. So we’re - - . Now, just for the sake, I've marked these, the epicondyles here, and I could take a ruler and draw across here. In my plan, I had the option of choosing in this plan whether I wanted to go by the epicondylar axis, which is the axis that I'm drawing, or whether I wanted to go by Whiteside's axis, or then you can also choose to go by the posterior condylar axis. So this all looks good. I don’t see any reason to slow down or – because I’m very happy with that axis. See these two holes line up with that axis there. Again the, the one block that I had there determined the size and the orientation of this block.

I will say that for – I’m doing what surgeons call a measured resection technique. For surgeons that want to do true ligament balance, you could stop at this point and balance your knee in extension and then balance your knee in flexion and do your routine technique. You would have used the TruMatch just to get the varus valgus alignment, your slope and your flexion to the femur. But I think the majority of surgeons choose to do a measured resection technique which is what I’m doing here.

I’d also point out that this is a traditional block, it just happens to be a cutting block that I’ve been very comfortable with. There are much smaller profile blocks that are available and can be, and are typically used with this system. This just happens to be the block that I like to use. That’s through there. And now we do what’s called the chamfer cuts. And watch the skin up there a little bit. One of the things that, you know, may be a misconception by, by some patients is this concept or term of a knee replacement. I think it’s probably better to think of this procedure as a resurfacing. You know, I’m taking pieces of bone that are, you know, just ten millimeters thick and they’re basically matching the size of the implant, and so I’ve had patients that have come in and said well, doctor, are you going to cut it here and cut it here and just put a whole new knee in. I think it’s better for patients to think about this in terms of it being a resurfacing.

So did just one of those pieces already come out? All right. So.

Andy, there’s a question that’s come up. You showed cutting the tibia first. Do you need to cut the tibia first to fit that femoral block in place or can you do the femur first and then the tibia?

No, I think you all saw the exposure there. I could have easily gotten that femoral block on. I have just always cut the tibia first. That’s been my preference. Mark, you’ve used this also and my guess is that you’ve cut your femur first –

Correct.

At times. So the, the posterior, which one have I got my hand on? The lateral one. That’s nine millimeters. Can you guys see that? Well the audience can’t, but it’s nine millimeters thick and I’ll add one millimeter for the thickness of the saw, so that’s ten, and they, yeah. Well, I’ll show it on the medial side here. They’ve got, got it all set so I can remember that it’s the medial side. They’ve marked it with an “M”. And so here the thickness, if you wanted to zoom in right on that caliper, yeah, I got it there. I think you can see that that's ten millimeters, and then we would add one millimeter for the thickness of the saw blade, so that would be an eleven millimeter cut, medially, and a ten millimeter cut laterally.
We go, moving on, since this is a posterior stabilized knee, we cut out what’s called the box, which is where the mechanism will reside that replaces or substitutes for those cruciate ligaments that I – well that slipped a little bit. Let’s put the other side in. It gave me a little shift. So I have to get these medially laterally in the position that I’m comfortable with. Okay, let’s give that a try. Watch it. There we go. Beautiful.

There we go. Thank you, John. We switch blades here so that we can put a narrow blade coming down the center. Take these pins out. And now we can go ahead and do some, we want to, while we’ve got the leg here I’ll, this is a part – one of the – you, you know, you can’t rely on the – I’m going to actually take that meniscus while I see it right there. These instruments don’t do the whole procedure. The whole team and everybody have to show up and these instruments are not balancing any ligaments. I still have to, have to balance the ligaments. But what they have done is they’ve got me good, accurate cuts so that I’m not chasing my ligament balance after bad or inaccurate cuts. If you’re, you’re adjusting ligaments to an improper or a poor cut, then you are not going to be happy with your, with your knee. This is again some tissue, part of the posterior cruciate ligament. There we go. You can see, maybe you can see some of the osteophytes in there so I will go ahead and remove some osteophytes from the back of the knee. This is a step that I think is sometimes missed, and that is leaving bone that can overhang off the back of the, of the implant. And so I find it very important to get here into the back of the knee to get these, these osteophytes off. Have we got a cautery available? There we go. Had a little tangle in the cautery. That’s good. Another piece of bone back here will be attached to the synovium. Let’s lift that up a little bit. Let’s pull your retractor out of there, Bob, and let me get in there. Got that cautery again, Linda? So I find it helpful, I really should be able to get my finger right there. And there’s a little flake of bone back there that I need to grab. This is sort of what I call the cleanup part. The next thing I’ll do is resist the temptation to put my components on. I guess I’ll slide the femur on just to make sure I don’t need to trim up my cuts. If this slides right on then my cuts have been, have been good. So that, I don’t need to do any more work cutting my femur.

I would encourage the audience to call in with questions and send some questions in, because this case is going so smoothly we’re going to have some time to answer some questions. This is the patella. There’s some, some controversy in knee arthroplasty now about whether to evert the patella. Some doctors don’t like to evert the patella or believe that it may have a faster recovery. I have always opted for seeing what I can do rather than, and trying to make the operation as easy as possible. I think the easier the operation is the more reproducible the result will be. That looks. So this is just a little bit of synovium on the back surface of the quadriceps tendon that we like to remove so that it doesn’t get irritated as it contacts the implant. So we’ll bring the knee up. Another area of controversy relates to resurfacing the patella. I measured this patella beforehand, and that patella measures about twenty millimeters. What I want to happen is to have my final patella be the same size when I’ve resurfaced it. So we’ll go ahead and I feel the back surface. I like to make this in about two cuts. The first cut gets my orientation. You can go quite thin with the patella but I don’t like to get much below about thirteen. I’ll go below that, but I don’t like to. That still measures about fourteen but it started quite thin. I’m just feeling the thickness. Let’s get that. Let’s let the knee come out just a little bit, to there. Linda, can you hold that foot right there? That will help me take a little tension off that. That’s good. All right. One more little trim. And then we will size that. Let’s try this. That’s a thirty-five, and that fits nicely. So we’ll go ahead. Linda, could you rotate that forward? Thank you.

So the first thing I’d like to do here is get a little bit of the bone dust off, and then what I typically do even before I put the parts in is double check my alignment with good old fashioned blocks. And so we’re going to check first the flexion space. And so this would be the equivalent of a ten millimeter. And we don’t need the rod until we do extension. So, so there’s my balance. Opening up, I’m opening maybe four millimeters medially. Laterally, now it’s a little hard to tell when you take the, take this off, but I’m opening about the same amount. It’s just opening halfway on the femoral side and halfway on the tibial side. But I maybe have a, a little bit looser on the medial side than the lateral side in flexion but not so loose that I’m concerned. And then I’ll come into extension and use the same block at ten millimeters. And that should slide right in. And then we’ll check the alignment. So there’s, there’s my alignment. And I’m, if you were looking straight like that, I’m in a, in some couple of degrees of varus of that. And then let’s look, I don’t think a lot, I’m not out here outside the ankle, I’m, I’m maybe a half a finger breadth. I also like to look at the slope. Is there a way to look from the side, maybe with the moving camera? And you can see – let’s move out so we can see the whole leg. Zoom out. Yes. So you can see that my slope is the same as my plan, which was to have no slope which would be typically what you would want with a posterior stabilized knee. So if I had one slight criticism at this point, it is that my knee is in a tiny bit of varus. And I will go ahead and put the components on. And one decision I have to make, I think I’m probably going to want to go ahead and take a tiny bit more bone just to fine tune that alignment. Let’s get that patella. So with the, with that on. So as we look in the knee I want to make sure I can get to full extension, so again, maybe the view from the side mobile camera. I think everybody would agree that this leg is, is into full extension. And then maybe we’ll
switch over to the view from straight above. And as we look there, I think, you know, that leg looks perfectly straight to me. Um, as I look up and down. So I’m, I’m very happy. So the other thing that we do here is we look into the knee and I’ll get a rake just to pull these aside, and we check the balance of the ligaments. And when I – let’s bring this down here a little bit. When I stress this, you know inside I want to see a little bit of opening on this side and a little bit of opening here. And I check this in full extension, and then I come to thirty degrees of flexion and check it. It’s hard to see laterally because the hip wants to move. And then I come – let’s let that rake go off – and then I come up to ninety and check the stability. And I can rotate that leg completely, and that’s, that’s, and always a debate, in any kind of surgery, is what is the enemy of good? And that’s, that’s where, you know, even with perfect blocks and a perfect plan, the surgeon still has to make the decision as to what they’re going to accept and what is appropriate because at this point everything is really excellent. I think I’m going to be very happy with that, and so that’s the parts that I’m going to want. So at this point we can go ahead and open this – is there any more cleaning I need to do? There’s a little bit of osteophytes over here.

Andy, while you’re doing that cleaning, maybe you’ve shown us technically how these blocks work, what do you see as a surgeon as the benefits of using this type of technology?

For me as the surgeon, the main thing is it, a lot of the decisions that I would typically make in surgery and a lot of the measurements that I would typically make during surgery are already predetermined. The plan is there, and I just really follow the plan. When I, when I didn’t have a computer, or I didn’t have a computer-created block, I didn’t know what to expect with these cuts. And I didn’t know when I was right or wrong. And so it just, it provides me with additional information which is very helpful in the surgery. It takes fewer steps. I don’t have to be thinking as much about the alignment of my cuts and I can focus more on ligament balance which I think is an important part of the procedure.

I would agree wholeheartedly with that. I think it allows the surgeon the opportunity, interoperatively, to focus on the, probably the most important part of the operation, which is that soft tissue balancing, trying to get the, the feel of the knee just right, not just focusing on the mechanics of the bone cuts. I think if we take a look around at your back table, Andy, the other thing that I see here is some major gains, probably, in surgical efficiency in the sense that you don’t have nine pans of instruments on this back table. Instead we see relatively small numbers of surgical instruments that are required, and that’s in large part due to that pre-operative planning that you’ve been able to do. You narrow down those implant choices so that your surgical team doesn’t need to get up every single option that’s available for the system. Instead you can focus on having the cutting guides and the finishing guides for the specific implant sizes that you need.

Certainly we’ve been able to get this down to one tray. One of the beauties was also that we had the implants in the room beforehand. Not all, you know, typically a hospital will have all of the implants available and they may be stored in a different room. And the assistants in the room, the circulating nurses would have to leave the room to get the implants. And obviously when that circulating nurse has left the room, it’s kind of like being man down in a hockey game. You’ve got your, it’s not a good situation to be in. You’ve got one less person in the OR. So there’s less people leaving the OR and I think that’s another easy way to understand yet another gain.

I know for a fact that Linda here, who has been working with me for some time, likes not having to lift four and five trays, and so I find that my OR staff is happy when I do one of these cases because the work involved in setting up the surgery is much less. And if you do three to five of these in a day like Linda would typically be doing helping me, you’re talking about twenty and thirty trays that she’s lifting.

So in addition to some interoperative efficiency gains you probably get some between surgery efficiency gains as well.

I think so.

Andy, there are a number of patient-specific type cutting guides that are available for surgeons to choose from. This particular one utilizes a CT scan preoperatively, and one of the questions from our audience was, do you have any concerns with the radiation required to do a CT scan or do the potential benefits of that outweigh any risks in your mind?

You know, depending on the type of CT scanner that’s used, probably the radiation that a patient gets with a CAT scan is somewhere between the equivalent of getting three chest x-rays and five chest x-rays. And I’m not real concerned about that, but I think that is a valid concern. But, and I have, I have had a patient now and then that
maybe has had cancer or something like that who has said I don’t want to get the CT. And, of course, you honor that and you, and you do your traditional knee, because I can still do a knee the way I’ve done it for the last fifteen years. The advantage for me of the CT is that as an orthopedist I am used to looking at bone. And a CT is a very familiar image for me to look at. I am not quite as good at looking at an MRI. Another concern in the comparison between CTs and MRIs is the ability of an MRI to see cartilage, which a CT can’t see. This system tackles that difference by using the cartilage estimate that I mentioned and a database of knees that have had both MRIs and CTs and we estimate the cartilage thickness. I think you can see from today that my bone cuts were within two millimeters of the expected, and so, and that included bone and cartilage in some cases. So I think that the way the system is set up to estimate the cartilage thickness pays off when I do this double check in the operating room to make sure that the thickness of my cut is the same as the plan.

Can you think of other things we need to talk about there, Mark?

I think that’s it. That’s a very, very reasonable thought process. CT scan, of course, allows the best resolution for generating a 3D model of any bony structure, so there are some real advantages in building those blocks from the best model possible. CT is clearly the best way to do that. These blocks themselves then recognize that we don’t image the cartilage and instead rely on finding boney points around the knee joints to anchor the, anchor the cutting block in place. Any potential down sides of not imaging cartilage are probably outweighed by the ability to generate the best possible 3D model of the knee joint itself.

I get a little bit of cement on the back of the knee here.

Andy, there’s also a question regarding the fact that you do not have to violate the, go into the intramedullary canal. Does that make bilateral simultaneous total knee replacements an option that you would consider? Does it change what you do for bilateral total knee replacements in any way?

I have not done yet a bilateral TruMatch case. I do think that not instrumenting the intramedullary canal is an advantage. Both from the possibility of what we call fat emboli that can occur, in rare cases, very rare cases, in a unilateral knee, but it has been described in a bilateral knee, but I also think that not having to instrument the canal is just helpful from the amount of postoperative bleeding. Maybe not so much in a posterior stabilized design that has a closed block, but maybe in a CR design where that hole would be exposed. And so there’s some advantage there in, I believe, in decreasing bleeding. It’s admittedly hard to fully quantitate. But if the knee swells less because there’s less blood in the knee, then the patient should have, should have less pain. How is that? Is that sitting down nicely?

I always get questions, and I’m surprised one is probably on its way in, is why is Dr. Engh putting that femur on first when I think traditionally people put on their tibias first. I started putting my femur on first when I first started using non-modular tibial components. If you have a component on the tibia that’s non-modular, sometimes, and particularly if it’s a posterior stabilized implant, sometimes it could be hard to get the femur over top –

Sure.

Of a, of a, of the post. I also realized that it takes a step away, one less step here, if I had put the tibia on first, I wouldn’t have put the poly in, and I would have gone and put the femur on and then had to come back and put the poly, and all of that would have been a series of manipulations, and so I’m really going to be doing one less step here because I’m going to put my poly in right away. And also may be different from what I think a lot of surgeons do, I think most surgeons would go ahead and do what we call a trial. Again it’s because I had some experience with non-modular components, I really don’t do a trial because it’s been rare with a good trial reduction for me to have to change the poly one way or the other. So you’ll see that I’ll go ahead and put my poly in right here because I’ve been so comfortable with the balance that I had early. I generally choose between a non-modular and a modular poly based on the quality of the bone. If the bone is particularly soft, I will go with a modular component. If I think that if the patient is very young and may need a polyethylene exchange, I’ll also go with a, with a modular. I’d say modular is my current go to tibia right now. You can see the cam that replaces essentially the cruciate ligaments. So we’ll slide that on and let’s get a little bit, there’s a little bit of cement hiding right there in the back. Let’s see if I can’t get that. Got a wet one, Linda? Get that out right there. Yeah. There we go. We’ll go back and give that a little squeeze and put the patella on.

So Andy, as you’re cementing that patella in place, I’m going to let our audience know that we’re coming close to the end of our broadcast here tonight. I’d like to thank the audience for joining us today for what we certainly
hope was an informative webcast highlighting the Sigma TruMatch Total Knee Replacement System. And this has been a presentation that’s been live from the Anderson Orthopaedic Clinic, the Inova Joint Replacement Center at Mount Vernon Hospital. I would also like to thank, of course, the patient and all the staff that have been here tonight for a great job, and appreciate all the efforts that have gone into this webcast tonight. Andy, any closing thoughts on the TruMatch System?

I think we’ve pretty well covered it. I, I like to think about this as just a complete plan. A complete, customized plan that is available and makes the surgery easier and more reproducible, but I would emphasize that it takes surgeon involvement to provide feedback on the initial plan and it takes a surgeon showing up in the operating room and still doing the procedure. The TruMatch certainly makes the procedure easier. It helps with the alignment. It decreases the number of steps. But you cannot rely on it to do the entire surgery. The surgeon has to show up and make all of the – many of the decisions that they traditionally make.

That’s an excellent summary. Again, appreciate the audience and everyone here. Have a good night.

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