

**GENDER SPECIFIC KNEE REPLACEMENT
BON SECOURS ST. FRANCIS HEALTH SYSTEM
GREENVILLE, SC**

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ANNOUNCER: Welcome to Bon Secours St. Francis Health System in Greenville, South Carolina. Over the next hour, you'll see a gender-specific knee replacement. This type of knee replacement is specifically contoured to woman's anatomy, to provide a more precise fit. It is narrower and thinner in shape and allows for a greater range of motion. OR-Live makes it easy for you to learn more. Just click on the "Request Information" button on your webcast screen and open the door to informed medical care. Now, let's go live to the operating room.

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DANIEL E. LEE, MD: Good afternoon and welcome to Bon Secours St. Francis Health System in Greenville, South Carolina. My name is Dr. Daniel Lee and I'm a local orthopedic surgeon and your narrator for today's webcast. Joining me to today to help answer you questions is family physician and recent transplant from Albany, New York, Dr. Gretchen Kaneb, who is in practice at Powdersville Family Practice. Our surgeon today is Dr. Bill DeVault, who'll be performing a right total knee replacement utilizing the gender-specific knee and also utilizing computer-aided navigation, a new technology, to aid in more accurately placing the components. Dr. DeVault?

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BILL DEVAULT, MD: Yes. We're doing a – We're registering the computer points on the femur right now so we can use the computer-assisted navigation.

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DANIEL E. LEE, MD: And I want to point out that Dr. DeVault and his staff are wearing what we sort of affectionately call "space suits", and those are to help prevent infection and you can see that obviously he can't breathe on the patient. No cells from Dr. DeVault or his helpers or assistants. And it's one of the many devices and practices we use to help keep our infection rate one of the lowest in South Carolina.

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GRETCHEN KANEB, MD: Dr. Lee, I'm just going to interject here. I just want to remind our viewers that if they do have any questions that they can use their MDirectAccess button on their computer and send us any questions to the OR and we'd be happy to answer them, regarding appointments, referrals, whatever they need. I'm here today also to answer questions if something is too technical from a primary care perspective, I'm here to answer any questions if anything gets to technical, if I need to clarify something, I'm here to hopefully help you do that.

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DANIEL E. LEE, MD: Right now we're looking, Dr. DeVault to speed the process and go ahead and expose the knee through what we call an arthrotomy, so that's opening up the knee joint and what you're seeing in the middle of your webcast right now is actually the end of the femur bone or the thigh bone. On the right side of your screen is what we call the medial side and we call that protuberance the medial

femoral condyle, and on your left of the screen you see the lateral femoral condyle. Right now the device that he just placed is what we call the notch of the femur. Part of what DeVault is doing now is he's placing the devices to help set up actual points to aid in navigation. It's an electromagnetic device that has software and enables him to more accurately place the different components and to make his bone cuts. One of the factors that's been discovered recently is that the more accurately we can place both the femoral, the tibial, and patella components, if that's replaced today, is that there's much less wear of the knee and much better longevity.

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GRETCHEN KANEK, MD: Now, before we went live here, I was asking about some of the points on the knee and we could see where maybe there was some damage done and could you maybe point those areas out to us a little bit better.

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DANIEL E. LEE, MD: Well, I think if you look on your right side of the screen, in the center, that the right protuberance, you'll see at the very center, you'll see what we call an ulcer in the cartilage, so that's significant wear there. Her primary or worst part of her knee is actually on the left side of the screen, the left protuberance, which is called the lateral femoral condyle and it's a little bit hard to appreciate depth but you can see that there's basically bone exposed through the cartilage on the entire lateral femoral condyle or the lateral aspect of the knee. In the center of that place called the notch, you'll see that's where the anterior cruciate ligament lives, as well as, behind that, the posterior cruciate ligament. The ACL, or the anterior cruciate ligament, is that ligament when you hear about a sports figure, a basketball player or football player, when they blow out their knee, that is typically the ligament that they have torn.

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GRETCHEN KANEK, MD: Now, in some cases during these surgeries, you'll do a sparing procedure where you'll spare one of those ligaments. Can you just explain that to us and if we're doing that in this procedure or not?

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DANIEL E. LEE, MD: Excuse me, would you repeat that again? I'm sorry.

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GRETCHEN KANEK, MD: Are we doing a sparing procedure where we're sparing that posterior ligament, or what are we doing in this procedure today?

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DANIEL E. LEE, MD: Good question. What we're planning to do is we'll take the ACL, because generally that is in an area that just really precludes being able to put the components in. But as I talked to Dr. DeVault before the surgery, our plan is to retain the posterior cruciate ligament, and that's kind of an area of big debate in the orthopedic community. There are plusses and minuses and I think because this patient is of relative young age, she's 58 years old, I believe that he feels, which I think is a very wise decision, to keep that PCL would give her better stability and a better knee. Bill, how are you doing?

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BILL DEVAULT, MD: We're registering the different points for the computer right now.

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DANIEL E. LEE, MD: Do you think we could go to that screen and show the viewers?

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BILL DEVAULT, MD: Mm-hmm.

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DANIEL E. LEE, MD: So what Dr. DeVault is doing, and this is a mock-up, but he's actually placing markers in different specific bony landmarks and the computer can

then record the different axes, or axes, to allow better and more accurate placement of the cuts. Again, as I said earlier, that's crucial for the longevity of the knee, because that way we have even wear, and my analogy, it's similar to having your tires on your car balanced properly. Obviously, if your tires are balanced properly, you're going to get better wear. You can see right now as these numbers change, that's reflecting, as Dr. DeVault is actually moving the knee in surgery right now, and the device is actually recording the different angles as he's taking the knee through different ranges of motion.

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GRETCHEN KANEB, MD: Now, we've been using this all along for a knee replace, is this something new?

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DANIEL E. LEE, MD: This is relatively new technology and it's been sort of tweaked all along and there's several different versions on the market but it's very, very high tech and it's expensive technology, but I think that as Dr. DeVault's very facile with this, it doesn't take much more time in a procedure. The device itself is relatively expensive for the hospital to purchase.

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GRETCHEN KANEB, MD: We're going to also take some questions from our online viewers. One of the questions we had is, "What are the signs that I need knee replacement surgery?"

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DANIEL E. LEE, MD: I think that that's sort of different, but typically pain in the knee that occurs most often with activity, so it's activity related. There may or may not be swelling of the knee. Sometimes if you've had trauma to the knee, if you've had previous surgery, those are predisposing factors. Sometimes weight, obesity, can cause problems with the knee. Repetitive activity or activity with a lot of vibration can cause. Then, if you start having angular deformity of the knee, or deformity where your knee looks more bowlegged or more knock-kneed, those are signs that your knee can have problems, as well as a term we call crepitus, which is crunchy feeling in your knee. That can be an early sign of arthritis. Then, following up with your family physician who may or may not then, depending on your clinical science, may refer you to an orthopedist.

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GRETCHEN KANEB, MD: I think basically when somebody comes in with knee pain, for us it's mostly clinical diagnosis where we may do some x-rays, we'll do a physical exam, maybe do some blood work, and then depending what all those results come back, then we'll send them on to you.

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DANIEL E. LEE, MD: Exactly.

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GRETCHEN KANEB, MD: Now typically, are we talking about osteoarthritis in these knees as the cause of the need for knee replacement here?

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DANIEL E. LEE, MD: Most often it is osteoarthritis, or we call it degenerative arthritis or wearing of the joint. Joint replacements are widely done also for conditions such as rheumatoid arthritis or lupus arthritis, and occasionally for such conditions caused by people who use chronic steroids, where they may have avascular necrosis of certain bones, which is loss of blood supply to the bones, which leads to death of the bone and collapse of the articular, or the joint, surfaces.

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GRETCHEN KANEB, MD: Then, typically how long, once somebody gets a knee replaced, how long can they expect them to last?

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DANIEL E. LEE, MD: That's a great question and we were kind of talking about that a little before, and I have this sort of answer I give to my patients and I tell them if you bought a set of tires, you wouldn't ask how long, you'd ask how many miles. So it's really a rate of how many cycles, which is your activity level, times your body weight. So someone who is very overweight, who is very active, their knee or hip replacement's not going to last that long. But if you're reasonably active and you're a reasonable body weight, I think you could reasonably expect a knee replacement to last 12 to 15 years and a hip replacement to last 25 years or more.

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GRETCHEN KANEB, MD: Now, let's get back to the surgery here and let's see what he's doing.

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DANIEL E. LEE, MD: What Dr. DeVault has done, from what I can see, he's retracted the surfaces. It looks like he's gotten his navigation set up and he has what we call the distal femoral resecting guide in place.

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GRETCHEN KANEB, MD: That's the instrument with the green tip on the end?

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DANIEL E. LEE, MD: Well, no, that's actually the gold one down at the end, and he's sort of checking things and he'll make some drill holes, and then typically what's done is we'll do a distal femoral resection, so we'll actually cut off the articular surface and the whole point of these procedures, we want to preserve as much of the patient's native bone as we can. One of the misconceptions that I think a lot of my patients have is that the orthopedic surgeons are going in and we're literally cutting the leg off in between. What we're really doing is resurfacing the joint and we're resecting the smallest amount of bone possible.

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GRETCHEN KANEB, MD: Now, you had a model here that I think some of our viewers might be interested in and I think it might show things a little bit better and where we are as far as where this joint is going to go and how it's going to articulate in the knee itself.

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DANIEL E. LEE, MD: What I have right here is a model with what we call sawbones or plastic bones and what you can see on this surface is the femoral component, and on the bottom surface here is the tibial component. So what we're going to do with this, and it's a little hard to take apart, so I may get out of the screen for just a second.

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GRETCHEN KANEB, MD: Now is this a gender knee?

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DANIEL E. LEE, MD: This is not. This is more of a general knee, but they're basically the same. So what you can see again on this model if you'll show it to me is we're actually going to cut square cuts, and these are called chamfer cuts, and we'll preserve as much of the patient's native bone as possible.

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GRETCHEN KANEB, MD: And that's about where Dr. DeVault is now, aligning for those cuts, right?

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DANIEL E. LEE, MD: Exactly. He's going to make this cut on this edge and square that off and that will be sort of the template from which he'll measure different angles to properly align the knee, and as we were talking about the actual computer-aided navigation will aid him in setting these angles and these cuts. Then the

component itself looks similar to this. This is a plastic model, but it's very much the same size and the same shape.

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GRETCHEN KANEB, MD: And we were talking about material. Again, the type of material that this is made out of?

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DANIEL E. LEE, MD: Typically, on this, and this is like I said a plastic one, the back is typically a titanium and we'll typically a rough finish so that it can be glued or press fitted in place, where the surface on the front or the joint surface is actually cobalt chrome-moly, which is a metal combination that does not rust and it can be highly polished because it needs to be smooth. Now, the tibial side is this component and it fits in the model here like this. Sort of the weak point, if you would, in all knee replacement sold in the United States is this polyethylene component. It's a plastic, high-density plastic that's sterile, but it will actually wear with time and that's the part that wears out, and it will actually cause, in most people, what's called a foreign body reaction and will cause the metal components to loosen up over time. So it's very important that you follow up with your orthopedic surgeon on a periodic basis as he or she asks you to, so that any problems like that can be detected early and perhaps even the polyethylene switched out.

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GRETCHEN KANEB, MD: Okay. Alright, let's go back to the OR and see where he's at.

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DANIEL E. LEE, MD: So right now he's putting in some pins, I think to hold his jig or guide that he's going to use to cut these with. Bill, how's it going?

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BILL DEVAULT, MD: It's coming along real well. We're making some adjustments on the femur to get it just at the right height and resection. Let me see. I might make an adjustment again.

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DANIEL E. LEE, MD: I'll point out a few things that we were talking about before surgery. It's a very complicated procedure. As you saw there there are many, many instruments that are required.

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BILL DEVAULT, MD: Let me have a drill again.

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DANIEL E. LEE, MD: Typically, we trial the components before they're placed and so we'll have a whole set of different sizes of the implants. I think that's an issue with the - We're talking about the gender-specific knee and the gender-specific knee is one that is more tailored to fit women because of the different geometries, and we were talking before the procedure about what does that mean. Typically, the flare, which is, if you look in the middle of the screen, right below the gold object, you can see the little notch, the v-shaped groove on the top of the bone. That's what we call the trochlear notch, and that's where the patella resides, the kneecap. Dr. DeVault has that flipped out of the way so that he can do this part of the procedure without damaging it. But that notch in women tends to flare out to the side more than in men. With men it tends to go straight. So the gendered knee has - the notch is flared out more and it's also thinner so we don't have as many patella femoral problems, and women tend to have more kneecap problems than men and that's to hope to prevent that. The flange, top part of the metal's a little bit thinner. It's thinner from side-to-side to fit the contour of a woman.

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GRETCHEN KANEB, MD: But, that actually leads us into another question that we had from one of our viewers about complications, especially if someone waits too long.

"Is there such a thing as waiting too long to get a knee replacement, and then if they do wait too long, are there more complications? I know you talked about complications if the knee doesn't fit properly." What other complications can we look at, especially as this person asks, if they wait too long?

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DANIEL E. LEE, MD: That's a great question and patients ask me that all the time. I tell patients - They ask me, "When should I have my knee replaced?" My answer that I give them, "When it hurts everyday, there's no good days, and it's keeping you from doing the things you want to do." But, in waiting too long, I think if you get to the point where you lose muscle strength, where you lose significant range of motion, then that's too long, because no matter what we do to replace the joint surface, we cannot make the muscle stronger. We're not going to make your range of motion necessarily much better, so if you're getting to the point where you're in a walker or a wheelchair, you're pretty much getting to the point where it may be too late to enjoy the full benefits. Now, it can be done and it may relieve your pain, but your outcome in terms of ambulation, your ability to walk, may not be nearly as good as it can be. Typically that doesn't cause any more complications in terms of infection or that kind of thing. The factors that can cause problems, if someone's had a neurologic incidence, such as stroke, it's usually not recommended to do a knee replacement on the affected side because they're too weak and may get very stiff after the surgery. If they've had a previous infection in the knee and it's not cleared up reasonably well, it's not recommended to do a total knee in that knee. There's some inflammatory conditions that can do that as well. Typically, compartment syndrome, nerve compression, those kind of things, they could be related to trauma during the surgery but not necessarily caused by waiting too long.

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GRETCHEN KANEB, MD: And blood loss typically is very minimal. I know we were talking about this before the surgery and you were explaining to me how there's tourniquets that are used to keep the blood loss to a minimum. So, typically blood loss is not a concern in any of the surgery?

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DANIEL E. LEE, MD: Exactly. With a hip replacement, that's more of a concern. There are different options you can use, such as recirculating the blood, cleaning and getting it back to the patient. But as you know, we put a tourniquet on the upper thigh of this lady and we take a big rubber band and then actually squeeze the blood out of the leg. The tourniquet is then inflated so the blood doesn't go in. So you can see, there's a little bit of blood, but there's minimal blood loss during the actual procedure itself.

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GRETCHEN KANEB, MD: So typically then if somebody comes to my office for pain in the knee, the one thing that I'm going to do for them is probably get them an x-ray.

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DANIEL E. LEE, MD: In a standing x-ray, I would say. That's important.

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GRETCHEN KANEB, MD: That's important. And probably do both knees, too.

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DANIEL E. LEE, MD: Exactly.

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GRETCHEN KANEB, MD: The other thing is, for pain relief, we're going to give something for pain relief, typically Motrin, Tylenol, depending on their health conditions. There are some other nutraceuticals, such as MSM, glucosamine.

Anything you want to comment about those?

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DANIEL E. LEE, MD: I think that's a great thing to bring up, because one of the things that patients come and say is, "What can I do before having to have this big surgery?" I think obviously you want to delay surgery as long as possible, because our goal is, hopefully if you do require a joint replacement, to do it once. If you have it done at a very young age, chances are you will wear it out and require what we call a revision, and that's a very complicated procedure, much more complicated than the initial joint replacement and fraught with a lot higher rate of complications. So some of the things, like you mentioned, like anti-inflammatories, things like Motrin, Advil, some of the ones that are prescriptions, such as Celebrex, if somebody has stomach problems, or Relafen, which has a pretty good profile for safety. Those are things we use, but I think glucosamine's a reasonable thing to try. Patients ask me about that and I tell them to typically try that for two to three months. If it seems to help them, we keep it up. If not, then probably go back to the prescription anti-inflammatories.

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GRETCHEN KANEB, MD: Let's just go back to the surgery for a minute and if you want to comment on what he's doing there, because he's doing something different now.

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DANIEL E. LEE, MD: Right now he's used his distal femoral guide and he's made what we call the distal femoral resection. So you can see he's cut bone off both the medial side, the side on the right hand side of the screen, and on the left hand side. That will sort of base how we size the femoral component off of that now.

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GRETCHEN KANEB, MD: Most of all, that angular instrumentation is coming off now.

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DANIEL E. LEE, MD: He'll change jigs, we call it, constantly throughout the procedure. One of the things – going back to the question about things you can do, there's been a lot of publicity about what we call viscosupplementation therapy. There are a lot of different products on the market. There's Hyalgan, Supartz, and three or four others and they're basically similar components that are made up, believe it or not, from the comb of the chicken, and that's purified and they've added some proprietary ingredients and preservatives and typically you're injected once a week for either three times or five times depending on how bad your physician assesses your knee and arthritis constitutes. That can be repeated every six months.

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GRETCHEN KANEB, MD: You do that in your office?

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DANIEL E. LEE, MD: We do that in our office and there are family physicians in the area who do it, as well. There's about, most data shows, between a 60 to 70 percent rate of success for that in terms of relieving their pain. Again, it can be repeated every six months.

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GRETCHEN KANEB, MD: Now, one question I had and I think I asked you this before. How do you determine when somebody needs a full knee replacement versus a uni-knee replacement and do you ever do a uni-knee replacement anymore, or is it mostly just full knee replacements?

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DANIEL E. LEE, MD: Well, both Dr. DeVault and I do partial, or unicompartmental, knee replacements, and we base it basically on our x-ray and clinical examination. Typically, a unicompartmental knee replacement, or a half knee replacement, as some of the patients call them, are suited only for arthritis on one side of the knee. That probably is about a third of all patients. Typically you want the other side of the knee

to be well preserved. You want standing x-rays to show a well preserved joint with lots of space or cartilage left in the joint, and they need good ligaments, because those are inherently more unstable. Most of the companies that produce knee replacements have some form of unicondylar partial knee replacement that they utilize.

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GRETCHEN KANEB, MD: Then, when you do a uni-knee replacement, is it likely that you're going to have to go back and do a full knee replacement?

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DANIEL E. LEE, MD: Probably so. Typically, we would tend to do those more on younger patients, but I think some of the indications are starting to change a little. There are certain ones on the market that have a very long life span, very similar to total knee replacements, and that these can be done very successful, and it may be the only knee that needs to be done in that patient. But again, I often with my patients – my caveat or my little condition is I'll tell them – I'll make the smaller incision for the partial. I want to look at the other side of your knee. If it looks good, if it looks like it's pristine, like there's no damage, then I'll proceed with the partial. But if there's any damage, for any reason I think that they wouldn't do well with the partial, I want their permission to make a little bit bigger incision and proceed with the total knee replacement.

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GRETCHEN KANEB, MD: Now, we're doing one knee here. Is it ever indicated to do two knees at once? Would you recommend doing two knees at once or do you recommend doing one knee and then the other knee?

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DANIEL E. LEE, MD: From a pain perspective, I wouldn't recommend it. But there are some compelling reasons. If someone has significant deformity in both knees and you feel like – Typically our goal, of course, is to restore a more normal anatomy, so that if there was going to be such a discrepancy between the two knees that you felt the patient would be hindered in their rehabilitation, then I would advocate doing both knees.

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GRETCHEN KANEB, MD: Now typically rehab for these knees, hospital stay is about three to four days...

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DANIEL E. LEE, MD: That is correct.

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GRETCHEN KANEB, MD: Then they'll go on and, depending on your age and your comorbidities, you may go to rehab in the hospital, you may do rehab at home. How long will somebody have to do rehab for these knees?

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DANIEL E. LEE, MD: We really try – That's a great question. People ask me that all the time and I try to answer and say it's really how hard you push yourself and what you can tolerate. Typically I tell patients that pain is really the only limiting factor in your activity level, unless we think there's a problem with their incision or wound. I would guess that patients, as you said, are typically in the hospital three to four days. Typically we would set up Home Health, through St. Francis Home Healthcare, and have that for them at their house three to four times a week, actually have physical therapists come to their home. Once they're not homebound anymore, where they can easily get in a car, they'll typically go to outpatient therapy for a total of about six weeks. I would tell you that most people would probably use a walker for two to three weeks and then progress to a cane at the three to four week mark, and hopefully we have them off of everything in terms of ambulatory aids at

the six week mark. I would tell you, I think it takes about three months to get the stiffness out of their knee and get their range of motion restored. The good news is, about 95 percent of people who have had total knees say they would do it again and are very, very pleased. Complications are few. There's typically in the United States about a one percent infection rate and we have about a 40 percent less than that infection rate at St. Francis Hospital System here in Greenville.

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GRETCHEN KANEK, MD: A lot of questions that I get, especially in my office, when somebody comes in with a joint replacement, a hip, whether it's a knee, prophylaxis with antibiotics for dental procedures, any other procedures, you'd recommend prophylaxis with antibiotics when they have these and for how long would you recommend?

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DANIEL E. LEE, MD: Typically Dr. DeVault and I are on the same page. We recommend use for at least one year if you have a dental procedure, a colonoscopy, or a prostate surgery, or a female surgery, recommend that anything that could be classified as a potentially dirty surgery, to keep those bacteria from inhabiting that knee replacement. We advise prophylactic antibiotics. Typically, most dentists and other healthcare professionals are pretty aware of that, but we both recommend that you call us or call your surgeon who placed your joint replacement in place.

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GRETCHEN KANEK, MD: All right. Let's see where Dr. DeVault is right now.

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DANIEL E. LEE, MD: Right now he's put on what I call the chamfer block, and as we saw earlier, we made those cuts. He's making his anterior femoral resection right now and now he assigns that utilizing the computer navigation, which was up on the screen a few moments ago. So there's typically – You can see he's taking the bone off the top. If you look on the positional, which is on the screen now, he's used these landmarks to help set his rotation of that component, that gold colored component, and that will allow more balance between the ligaments, and that's critical. So right now, Bill, do you want to talk to us about how things are going?

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BILL DEVAULT, MD: Yeah, for making our anterior femoral cut – can I have the saw back? We were – and check to make sure it wouldn't notch the femur, and then we're going to make our other cuts from the femoral side here. A little bit of noise.

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DANIEL E. LEE, MD: Notching the femur's a great point. That's something we try to avoid. That typically – there are lots of little steps, but notching the femur usually indicates in that top cut that he made, where his finger just touched up there, if you cut too deeply, you can make a little notch in the end of the thigh bone. If you do that too deeply, the patient's at great risk for breaking their leg at that point. So that's something that we try to avoid at all costs and I saw him earlier. He was checking with a little device that he knew – he actually knew that he wouldn't do that. Right now he's removing the pins that hold the block in place. They're stuck in. This lady has pretty hard bone, which I think brought up a point you and I have talked about, about the difference between osteoarthritis and osteoporosis.

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GRETCHEN KANEK, MD: And osteoporosis.

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DANIEL E. LEE, MD: A lot of my patients come in the office and they say, "Well doctor, I've been told I have osteoporosis. Does that mean my knee is worn out?" Osteoporosis, as you know, literally means a more porous bone, more porosity of the

bone and a softer bone. Osteoarthritis is a wearing out of the joint surfaces and they're not directly related.

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GRETCHEN KANEB, MD: No, not at all. I think that there's a lot of confusion regarding the two. The osteoarthritis is more of an inflammatory component, the osteoporosis is bone loss and loss of bone integrity, and that's where you get it. It mostly happens in the spine and the hip. That's where we measure it with our DEXA scans. A lot of that is related to hormonal loss, hormonal changes in men and women. It's something that – a lot of it is age related. A lot of it's genetic.

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DANIEL E. LEE, MD: So what do you typically – when you see a women who's post-menopausal, they've stopped having menstrual cycles, they're thin, they're white, which we know is a risk factor, being Caucasian, what do you do? What do you start them on? You see this.

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GRETCHEN KANEB, MD: There's a lot of studies out there that have scared people. Typically, what I will do is, it depends on their symptoms, their post-menopausal symptoms. If they're severely symptomatic, then I definitely will start them on hormone replacement therapy for a limited amount of time. If they have any heart problems, of course, I will probably not start them on hormone replacement therapy. There are other drugs out there, the disphosphonates, that are a weekly drug now, a monthly drug. There's injections out there that are available. It's very variable. Everybody is specific as to the treatment, so the thing that we have to look at is calcium replacement. Are they taking enough calcium? Are they doing enough exercise? Are they on any other medications that can cause bone loss?

Hyperthyroidism could cause extra bone loss. Diabetes can cause extra bone loss. So we have to look at all those co-morbid factors and factor that into, "When do we treat? How do we treat?"

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DANIEL E. LEE, MD: What about smoking and alcohol use? Do those tend to cause problems with osteoporosis?

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GRETCHEN KANEB, MD: Not usually. Smoking and alcohol are more osteoarthritis. What they say now for osteoporosis is 40 to 80 percent of osteoporosis is genetic. It all depends on how much bone mass you have laid down, sort of, in your adolescent years, your teen years. By the time you're 30 years of age. That's when your peak bone mass is, and then it will, how much that peak bone mass is, depending on how much you will lose as you age. And depending on your hormonal factors. In men, it's testosterone. In women, it's estrogen. So, there's a lot of factors. Vitamin D, they're finding that vitamin D receptors in bone sometimes now can cause us to porosis if there's the wrong receptor. They're replacing vitamin D on higher levels now, so about 800 international units of vitamin D, along with your calcium

00:29:29

DANIEL E. LEE, MD: I think we have a question here. I'll read it this time. "Does the surgeon out the scar tissue from a patient who has had a previous knee surgery when doing a total knee replacement?" It kind of depends on where the scar is. Typically, if they have a midline incision, typically the one we use, and we typically will cut the scar tissue out. We call it lips and add our circle around it and cut that scar tissue out and then try to go straight down the middle. If they have a scar that's off to the side, we typically will try to make our incision as far away from that as possible. What we don't want is any loss of vascular supply or blood supply in that tissue between the two scars. Now, if we go back to the knee right now, I think Dr. DeVault has removed the last block and he's cutting what we call one of the notch

cuts, or he had cut one of the notch cuts, which allows the femoral component to fit more closely on. So right now, to the left of your screen, underneath his assistant's hand, that's the kneecap, and you see it's sort of upside down. It's wedge-shaped. There is some wear and tear on that. Bill, do you think you're going to replace her patella?

00:30:34

BILL DEVAULT, MD: We're looking at a ten resection.

00:30:40

DANIEL E. LEE, MD: Bill, do you think you're going to replace her patella?

00:30:46

BILL DEVAULT, MD: We're going to do a tibial resection and try for about ten millimeters of resection.

00:30:50

DANIEL E. LEE, MD: What you can see, the red lines across the screen. That's actually showing the angles that are being recommended.

00:30:56

BILL DEVAULT, MD: It's kind of like a go, no go situation, so we should tell when we have it just right.

00:31:04

DANIEL E. LEE, MD: Dr. DeVault and I were talking before the surgery about the computer-aided navigation and the way they explain it to the audience, and I think he had a really great idea. He said it's GPS for the knee, and that's really more or less what it is. It's just allowing us to more accurately place ourselves in a position to optimize and make better cuts on the bone. As we said earlier, the goal is to take the minimum amount of bone to allow us to put in the components with a correct tension on the soft tissues.

00:31:32

GRETCHEN KANEB, MD: There was a second part to this question. "Is there a point where a total knee would not benefit a patient due to scar tissue?"

00:31:38

DANIEL E. LEE, MD: I think that depends on the kind of scar tissue. If someone, say, had a burn on the back of their knee, or they had scar tissue where their knee was extremely stiff, there was very little range of motion, and it may be that doing a knee replacement really wouldn't benefit them that much. Fortunately, that's a fairly rare circumstance, and that's good. So right now we're looking – Can we go back to – There we go. So what he's doing...

00:32:13

GRETCHEN KANEB, MD: He's putting another device on there or something.

00:32:14

DANIEL E. LEE, MD: He's putting a guide for cutting the tibia. So what he's done is he's used his landmarks and utilized the computer navigation device. Basically, he's put in metallic markers at certain specific landmarks on both sides of the knee, on both the tibial side, the lower leg bone side, as well as the femur bone side. That then allows, on this computer screen, that red line allows him then, he can adjust his cuts to cut the exact amount that he wants, that he has proper tension in the soft tissues and proper bone resection.

00:32:47

GRETCHEN KANEB, MD: We've got another question from the audience. "I've heard you've got to be careful not to damage the sciatic nerve during a total hip replacement surgery. What about a total knee replacement?" Obviously, they're worried and concerned about nerve damage there. Are there any nerves there to worry about when you're doing the knee replacement?

00:33:03

DANIEL E. LEE, MD: There are. There are several superficial or skin nerves. That's why we make the incision in the middle of the knee. Most of the nerves come from the back of the leg around to the front, sort of ramify out like fingers. So if we cut in the middle, we minimize the amount of numbness that a patient may have. Obviously in the back of the knee, there are some very important nerves. Typically those are not very often injured. There is a nerve called the peroneal nerve, which is a nerve to the lateral, the outside. It's the nerve that allows your foot to come up and gives you sensation on the top of your foot. If you have a very deformed knee and your correcting a lot of deformity, you can put a stress on the knee and that's what we call a valgus knee, someone who's got the knock knees, and that side is contracted. As you straighten it out, there is a danger of damaging the peroneal nerve. The sciatic nerve, which is damage during total hip replacement, hopefully not very often, is right in the area where a lot of the dissection is done.

00:33:55

GRETCHEN KANEB, MD: All right. We've got another question coming up. "Do you need a referral from a primary physician to see an orthopedic?"

00:34:00

DANIEL E. LEE, MD: That's a great question and I would say it depends on your insurance and your situation. If you have Medicare or – most private insurances does not require a referral now. Some of them do. I think CIGNA may. It depends on the CIGNA, or the type of insurance, so typically you would call your insurance carrier or your primary care doctor. Some orthopedists want a referral. I know in my practice, and I think in Dr. DeVault's, we don't require that.

00:34:24

GRETCHEN KANEB, MD: I think typically what happens is that a patient will come to us with knee pain and they'll, depending on the situation, depending on the physical exam, we'll do a little bit of work on them, initially do the x-rays, and then probably send them on to you. Especially if they're younger, too, and they've had knee pain for some time. I think it's important that they see somebody, or if they're athletes and runners.

00:34:46

DANIEL E. LEE, MD: Right, and I think it depends on their symptoms. If the knee is swelling, if their knee is red or hot, if their knee is locked or unstable, those are situations that require more urgent referral or more urgent visit to the doctor.

00:35:00

GRETCHEN KANEB, MD: I know in our office, we'll do cortisone injections. We don't do SYNVISIC yet, but that's a possibility, but we will do the cortisone injections in our office.

00:35:07

DANIEL E. LEE, MD: There's a lot of question. That's a great lead into another issue. Patients ask me constantly, "Is it bad to have cortisone injections?" That's a debatable issue. I think too many cortisone injections in a normal knee is bad. I've kind of used that as my last resort and when I see a knee that's worn out and say a patient is 64 years old he wants to work one more year, I think it's very reasonable to give that patient repeated cortisone injections, typically every two and a half to three months, to get them to that point where they're comfortable having their knee replaced. So I've kind of used that when someone knows that their knee is damaged, so there's really no risk of damaging the knee much further. Like any invasive procedure, even an injection has some risk of infection and complication. Right now, Dr. DeVault, the device he has in his left hand, with the green patch square, that's one of the devices that's helping him. It measures the angle. That's going through his guide. He's arranging the guide for his, what we call, proximal tibial resection. That's a mouthful. Simply put, he's going to cut off the top of the

lower leg bone, which is how we're going to put in the component that goes on top of the tibia. Right now, you can see the tilting. That's showing how much angulation that he's going to cut off. The bottom line, where it says "lateral" and "medial resection" shows the different millimeters. So typically we're not going to cut it off straight because the knee is worn out eccentrically. It's worn out more in this case on the lateral side. So to balance the knee will take more bone to allow that to balance out. So that's helping him. You can see the numbers changing. That's as he's actually adjusting and looking at the screen and he's able to visualize what angles or cuts – you can see on the view on the left, where it says "varus", you're looking at the knee in a straight on position from the anterior side. Then, on the right hand screen, you're looking more what we call "lateral view". So if you see right now, he's sort of adjusting. You can see that red line move. He's adjusting at different angles so he can decide the type of angulation that he wants. That's the unique thing and the exciting thing about this computer navigation. It's done in neurosurgery, as well, for brain tumors and activities such as that.

00:37:22

GRETCHEN KANEB, MD: So he'll keep shaving off the bone until he gets to it.

00:37:23

DANIEL E. LEE, MD: He'll make one cut and then he'll try to remove the bone in one position. Right now, he's nailing in that device you see in his left hand. It's actually the tibular resection guide, it's called. There's a slot in it that you can see and I'll actually put a saw blade in that.

00:37:44

GRETCHEN KANEB, MD: So, that's his guide

00:37:45

DANIEL E. LEE, MD: That's his guide. Typically, we'll place a device behind the knee to protect the blood vessels in the nerves from inadvertently cutting them with a saw. So, Bill are you getting ready to make your proximal tibular resection?

00:38:01

BILL DEVAULT, MD: Yes. We're getting our slope in position, adjusted, and I think we've just about got it. Let me have one more pin to stabilize this better.

00:38:07

DANIEL E. LEE, MD: So, like he mentioned, this is three-dimensional, so you have to think three-dimensionally, and I think that's one of the unique things about orthopedics is that you have to visualize several dimensions at once and he has to do this for slope that's built into the device, and that means, from the front to the back, how much is this device going to tilt. You want a little bit of slope in it, not a lot, but a little bit of slope. How much from right to left is it going to slope and rotation?

Those are all things that the computer-aided navigation helps us to get more accurately.

00:38:40

GRETCHEN KANEB, MD: Now, when this knee replacement is completed and in any knee replacement, what typical exercises are you going to recommend that they stay away from, and what exercises are you going to recommend that they continue to do?

00:38:55

DANIEL E. LEE, MD: I think most orthopedic surgeons will tell you that they think that we advocate, after a knee replacement or if someone's having knee problems and they're trying to prolong it, to do what we call non-weight bearing exercise, and typically that means swimming, which is probably the best exercise to do non-weight bearing, or something like the stationary bicycle. We tend to kind of stay away from any high impact activities such as running vigorously on concrete, jumping, those type of things. I think even elliptical machine would be acceptable, as well.

00:39:24

GRETCHEN KANEK, MD: So, marathon runners aren't going run a marathon again.

00:39:26

DANIEL E. LEE, MD: Marathon runners really shouldn't do this. It's really going to put that knee to too much of a test. So, right now you can see in the upper part of the screen, the femur's been cut, and it's pretty much finished, that part of it. What he's going to do to further check - because, like anything, you want to trust your computer but he's double-checking, which is a very wise thing to do. He's checking with an alignment rod. That's the device in the lower left hand part of the screen, and he's checking and he'll check to make sure that follows down, typically the center of the ankle, and making sure that he's not going to cut too much bone or too little bone. We always say it's a little better to cut too little, because then you go back and recut.

00:40:13

GRETCHEN KANEK, MD: We didn't mention that this patient has a spinal during this procedure and is mostly awake during this procedure, and that's something that I think that's variable depending on the patient and what they want to do. Typically, do knee replacements - are they awake during the procedure and is it necessary to be awake during the procedure?

00:40:34

DANIEL E. LEE, MD: It's not. You can go to sleep. You can be put to sleep and have a general anesthetic, but we generally feel that overall, it's a bit safer. It's a small, but significant, percentage safer to have a spinal, and unless someone is terrified or had reasons that we feel like they can't tolerate a spinal, such as previous back surgery or problems where they just can't lay comfortably on their back, we generally recommend the patients proceed with a spinal. Typically patients may even have some, not painful sensations, but they may feel their body move around, they may hear the saw, as you do now, going, and I've had patients that mentioned this, but typically no one is - I've not had anyone terrified by this yet.

00:41:14

GRETCHEN KANEK, MD: Okay. So it's like going to the dentist and hearing the dentist's drill?

00:41:19

DANIEL E. LEE, MD: As long as you don't feel it, most people aren't too bothered. You saw he did the saw and he made part of his proximal tibular resection. The device he has in his hand now is called an osteotome and it's really a very sharp, what I call, a cold chisel, which means it's beveled evenly on both sides. It cuts straight into the bone. So, typically we use that to lever that piece up, and then we'll take knife probably, or an osteotome like he's doing now and going in the back of the knee.

00:41:46

GRETCHEN KANEK, MD: Like a chisel.

00:41:47

DANIEL E. LEE, MD: And sort of loosen up any soft tissue that's holding that piece in place.

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GRETCHEN KANEK, MD: Now, can we see the ligament there? Did we see the cruciate ligament there at all?

00:42:00

DANIEL E. LEE, MD: There's a little bit of it in the center, still remaining. He's cut a significant part of it away, which is normal to do. So he's lifting out part of the tibial plateau. He's made a nice cut. It looks just right.

00:42:16

GRETCHEN KANEB, MD: A lot of patients worry about pain after the procedure and when they get back to their room, how much pain are they going to be in. Are they going to get up? If someone has surgery in the morning, and they're going to come in the day of surgery, they come in in the morning and they're back in their room by the afternoon, are they going to get up that night and walk on that knee, or when will you get them up?

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DANIEL E. LEE, MD: Typically I personally try to get them up as soon as possible. Sometimes if there's any factors where we think there may be excess bleeding if you get up and move to soon, we may not get them up early. We really feel like getting them up early helps prevent blood clots. It helps to keep the knee moving, because if you have a knee replacement and you're not committed to your therapy, you won't do as well. You'll have a stiff knee. So it really requires – The easy part is doing the surgery. I tell my patients that then my job becomes their cheerleader. I'm going to encourage them and cheer them along in the hallway and monitor their progress. So it's very important that if you decide to go through with a procedure like this, that you follow your physician's instructions, that you commit to fully participating in your therapy.

00:43:19

GRETCHEN KANEB, MD: We have another question from the audience. "Can you use gender-specific on a small male?"

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DANIEL E. LEE, MD: You could. I don't know if there would be any benefit. The company that makes that, they make some that are not gender specific. But I think what we would do, you'd evaluate the patient's x-rays, make certain measurements, and see if you felt it was appropriate or not. The company that manufactures that has a very large range of very excellent products and we can actually even have some custom made if that's necessary.

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GRETCHEN KANEB, MD: I think we talked about that as the up and coming thing in knee replacement that we'll be having custom knees.

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DANIEL E. LEE, MD: I think there's a couple of companies that have in the works proposals that you would actually have a cat scan or a CT scan made and x-rays and you would actually send that to the company and within several weeks the surgeon would receive back a custom made implant for that patient. You would still want backups, that wouldn't be the end-all.

00:44:14

GRETCHEN KANEB, MD: We have talked about, you and I, about some of the risk factors for knee replacement, and one of them, and it's a growing problem in the United States and all over the world, and that is obesity. Generally, before an operation, do you recommend weight loss, and then after the surgery do you recommend further weight loss and is it going to have their knee last a little bit longer if they do lose this weight?

00:44:43

DANIEL E. LEE, MD: It's a great question. I typically tell people, and it really depends on the amount of obesity, the good news is, believe it or not, knee replacements tend to last just as long on obese patients because, as we said earlier, it's a result of cycles and weight. Unfortunately, most obese people aren't quite as active as people who are not obese, so that their knee replacement actually last about the same amount of time. Although they have more complications. It's harder to do the surgery, technically, for the surgeon. They tend to recover more slowly. They tend to be hospitalized longer. They tend to have a higher rate of pulmonary emboli and

deep vein thromboses, blood clots that we hear about so much, as well. Not really much of an increased rate of infection.

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GRETCHEN KANEB, MD: But probably a little harder for them to rehab, also a little more painful.

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DANIEL E. LEE, MD: Exactly. Very much harder for them to rehab.

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GRETCHEN KANEB, MD: So it will take a little bit longer.

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DANIEL E. LEE, MD: Exactly. More time in the hospital. More time for rehab. And of course, you know, if patients are morbidly obese, I will sometimes even recommend bariatric surgery, and then we'll try to set together a reasonable target goal and then we get to that goal, then we'll do the joint replacement. I don't recommend starving themselves during their recovery, because all of those things will – You want good nutrition. You want good health during the recovery for better healing and less infection. Obviously, after though, I typically try to make a deal with them and say, "Okay, I'll do your knee replacement and our goal is going to be a certain weight that's reasonable for that patient." Right now, what Dr. DeVault is doing, he's hammering in, literally hammering in with pins, the proximal tibial guide. What he'll do is he'll contour the inside of the tibia to fit the size. It's also a sizing guide. He sized the tibia. He set his rotation on the tibia, and you can see then, he'll drill a hole through that guide, with a very large drill bit, and that's where we place the bone cement that gives it better purchase.

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GRETCHEN KANEB, MD: Now, it's interesting, this bone cement, you were saying what it was made out of. What is the bone cement made out of?

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DANIEL E. LEE, MD: You'll see it mixed in a little bit, but it's a polymer and it's called polymethylmethacrylate and what we were laughing about earlier was that it is exactly the same material as corian marble, a high-end synthetic marble finish in kitchens. Now, this patient happens to be diabetic, so Dr. DeVault's very wisely using a product called Palacos G, and the "G" stands for gentamicin, so it's had some antibiotic powder added to the cement mixture, and over about a six week period of time, that antibiotic will sort of leak out or leach out into the tissues and there's some good data, especially from Europe, from Sweden, that says that there's significantly less infection rate when you use this product in patients that may be at more risk. Unfortunately, diabetes is an increased risk of infection.

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GRETCHEN KANEB, MD: Now he pounded in something there.

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DANIEL E. LEE, MD: That's what will fit the contour of the tibial component. Typically, there's a flare or a square sort of I-beam construction in it, so that's sort of a negative mate to that and that will let them fit in. Right now, he's just removing some of the pins that hold that in place. He's taking the tibial component away. Typically, now we'll get into what we call the trial. He's put a trial tibial component in place. He's going to remove the retractors. See that retractor is called the McHale retractor, and that is to protect the structures in the back of the knee. Now, the ligaments that you saw between the two times, that's the PCL, the posterior cruciate ligament.

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GRETCHEN KANEB, MD: And we're going to spare that in this operation.

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DANIEL E. LEE, MD: We're going to keep that. Right now, you can see he's moving that tissue out of the way. He's putting on what we call the trial femoral component. You see these components look very similar to the ones that we showed earlier.

00:48:31

GRETCHEN KANEB, MD: We were talking about this earlier. I said these orthopedic surgeons must have to go to the gym to keep up with their muscle strength because all the pounding and everything that they have to do and the maneuvers they have to do, you've got to keep up your strength in your hands and your arms. There's a lot of work involved in these surgeries.

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DANIEL E. LEE, MD: It can be physically taxing. If you see that Dr. DeVault, the space suit unfortunately is not very cool. We have a lot of drapes on. It can be a very demanding profession and these can be very physically demanding procedures. Right now, he's putting the polyethylene component in, and that's the one that we have variable thicknesses. They typically go from 10 millimeters, so one centimeter is about the smallest, up to about, depending on the brand, 22 millimeters is usually the thickest. So, Bill, what size poly do you have in?

00:49:15

BILL DEVAULT, MD: It's a ten millimeter.

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DANIEL E. LEE, MD: So, he's got - That's good.

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BILL DEVAULT, MD: Yeah, I like that one. It works good.

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DANIEL E. LEE, MD: So, like anything, any mechanical device, you want a little bit of play.

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BILL DEVAULT, MD: That's what we want.

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DANIEL E. LEE, MD: You want a little bit of play.

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BILL DEVAULT, MD: I really like that. Okay, we'll use an E femur and a ten-millimeter tibia.

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DANIEL E. LEE, MD: Are you going to replace the patella?

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BILL DEVAULT, MD: No, I think I'm going to leave the patella. She's young and it doesn't have a lot of wear on it.

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DANIEL E. LEE, MD: I think that's perfectly acceptable. There is some debate about whether or not you need to replace it every time or not, and I think probably it's very wise to base your decision-making on what it looks like at the time of surgery. Like a lot of things, I think a lot of people have the misconception that a lot of medical decision-making is black and white. It's really mostly gray. We try to base our decision making on what we honestly feel is in the patient's best interest.

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GRETCHEN KANEB, MD: Okay, another question here. "Do female or males typically have knee replacement?"

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DANIEL E. LEE, MD: Right now, the majority, about 60 percent of joint replacements, are females. I think it's a factor that the females are more predisposed to osteoarthritis and there are also more females alive at older ages. So you've got two factors that factor into that. So right now he's sort of locking in. He's going to

probably remove that. He did the procedure we call "tripling the components", so he's happy with that. As you noticed, he talked to the sales rep, and typically with most of these cases, we have a representative from the company that manufactures the device and are highly trained, but they in no way do the surgery or assist in the surgery. They're basically there to make sure that the product they sell that that is in place. They will hand that then to the circulating nurse who will open it up in a sterile fashion. They're a big help in terms of making sure that all the proper instrumentation is there and, as you saw, there are literally hundreds of different instruments, and they help to make sure that everything is properly there.

00:51:19

GRETCHEN KANEB, MD: He's just washing out all the bone pieces.

00:51:23

DANIEL E. LEE, MD: Washing the bone pieces out. Two reasons to get the debris, these bone fragments out, and also it helps prevent infection. You'll notice Dr. DeVault will wash that knee out multiple times during the procedure. He's already washed at least three times that I've seen.

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GRETCHEN KANEB, MD: Now, a joint typically has fluid in it.

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DANIEL E. LEE, MD: Correct.

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GRETCHEN KANEB, MD: When we open a joint up, as in this procedure, there's not going to be any fluid.

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DANIEL E. LEE, MD: Well there may. There may. That depends on how bad the arthritis. Some people have what we call an effusion, when there's abnormal fluid in the knee. Very often when you first open, there will be some effusion, but once we get to this point, we've drained all the fluid away. What will happen is, when we let that tourniquet down after and the knee is closed up, the knee will fill up with blood. That's called a hemarthrosis, fancy word that just means blood in the knee. Over time, the body will break those blood products down and reabsorb them back into the system. The knee will feel somewhat hot and swollen, and so some people confuse that with the possible infection, but I don't want to discourage anyone from immediately contacting their orthopedic surgeon if that happens and I think most reasonable surgeons are going to check that out and be sure. Once in a while, we'll put a needle in the knee and draw some of the fluid out. We may draw it out for the purpose of getting the pressure down, or we may draw it out for the purpose of sending some of that blood to the laboratory and analyzing it and culturing it to see if there is infection.

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GRETCHEN KANEB, MD: But they'll never have that synovial fluid that was there in the original knee?

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DANIEL E. LEE, MD: Actually, they will. They'll actually have some joint fluid back in the knee. Right now, he's marking some areas and taking care of some blood, bleeding. He's putting in a retractor.

00:53:08

GRETCHEN KANEB, MD: So he's about 80 percent complete with this knee now?

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DANIEL E. LEE, MD: Correct. So, typically most knee replacements we would cement the tibial component in place so it's very important to get good visualization of that surface to expose the bone surface completely. We don't want any soft tissue interposed between the component and the bone.

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GRETCHEN KANEB, MD: These glues, when they harden, is there a heat component to these glues also?

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DANIEL E. LEE, MD: They actually heat up to about 145 degrees, so it's pretty hot. You really couldn't hold this in your hand. Typically there's about a 15-minute drying period. So right now, what he's doing, he's just packing some sponges around that to absorb any excess fluid. The bone in this area tends to be what we call trabecular bone, or bone that's more porous at the end of the bones, and so you want good cementation. You want the bone cement to fill in these inner digitations and give you a good bond.

00:54:00

GRETCHEN KANEB, MD: A woman who has osteoporosis, and typically your older women have osteoporosis and those are the ones you're going to do the knee replacements in. Trabecular bone is what the bone loss is in osteoporosis. Do you have trouble doing these knee replacements with osteoporotic...

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DANIEL E. LEE, MD: We have to be much more – we're always careful, but even more careful, and sometimes what we'll have to do is, you'll notice that – In this lady, because she's relatively young, 58, and the average age in the United States is about 73 for hip or knee replacement, so she's relatively younger and better bone stock, but in a more fragile lady with severe osteoporosis, we very often will put a component that has a long stem that we can attach to it, to give us purchase down more distally, at what we call the cortical bone, or the harder bone. That's a great question. So, we typically make those decisions based on the x-ray examination that we have and in the density of the bone and we do have to make adjustments for that.

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GRETCHEN KANEB, MD: It's basically the same when you're doing the hips too?

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DANIEL E. LEE, MD: Exactly.

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GRETCHEN KANEB, MD: Now that's the glue. That's the corian countertop right there.

00:55:02

DANIEL E. LEE, MD: Exactly, and you can see that it's green. That is really more [sneezes]. Excuse me.

00:55:09

GRETCHEN KANEB, MD: Bless you.

00:55:10

DANIEL E. LEE, MD: So we can visualize. So it's a color that's not really natural in the body, in me, anyway. So that little pieces can break off while it's drying during the cementation process and then we can pick those pieces out more successfully. So he's drying off the bone surfaces. Again the tourniquet is keeping it from bleeding. Bone is very vascular. It has a good blood supply. Most of your blood elements are made in the bone and it will bleed profusely without a tourniquet.

00:55:38

GRETCHEN KANEB, MD: How deep is that? I know he made that sort of hole with the saw, but how deep are we into the bone there?

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DANIEL E. LEE, MD: He's about probably two and a half to three inches deep in the middle section where he made that drill hole.

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GRETCHEN KANEB, MD: So, he'll put that glue all the way down into there.

00:55:51

DANIEL E. LEE, MD: The glue right now has the consistency of toothpaste, if you will. What he's doing, typically, he's using basically a sterile tongue blade, which we all use to help press that in the inner digitations in the bone, and then he'll put some on the back of the tibial component. You see he's got that in his left hand and this, as I said is typically, because of the way the knee is designed by our maker, that it's easier to put that tibial component in first. So you can see he's putting that down in the knee. Then you see the cement squeezing out around the periphery. So he's going to impact it. He's going to pound it in place. Typically we have a little cement tool and he'll remove the cement around that.

00:56:48

GRETCHEN KANEB, MD: Now there's a knee that has an increased mobility and it's a newer joint that they're using. Can you explain a little bit about that for our audience?

00:56:59

DANIEL E. LEE, MD: This particular knee, this one is called a high flex knee and it's designed to get more flexion. There's another one on the market by a different competing company that has a rotating platform.

00:57:10

GRETCHEN KANEB, MD: That's the one. Yes.

00:57:11

DANIEL E. LEE, MD: It's felt that that may give a more natural motion to the knee. Generally, a lot of patients will come and ask, "What knee should I have? What brand of knee?" I would tell you, you need to go to someone you're comfortable with, someone who does a lot of that procedure in their community. Typically, I would really tell you, in the United States, we're blessed that we have five or six major companies that all produce good replacements, and none of the major ones are bad, and I think you can go to your surgeon and he or she can explain to you their preferences, and typically there are very logical reasons why they prefer that. I think for me or a family member of mine, I wouldn't have a problem with any of those brands being implanted in them or myself. This particular brand is a very excellent brand that's been around for many, many years. I've implanted many of them myself. He's packing bone around the femoral side and he's physically pushing it with his finger, and then he'll literally pound on the femoral component, and this glue, the polymethylmethacrylate, will actually dry and adhere the component to the bone surface.

00:58:22

GRETCHEN KANEB, MD: Now, will he wait for that to dry before he closes or will...

00:58:26

DANIEL E. LEE, MD: He'll wait for it to dry before he closes. Dr. DeVault, how's it going?

00:58:31

BILL DEVAULT, MD: Yes. We're getting ready to cement the femur in, and then we'll be just about done, except just closing things up.

00:58:38

DANIEL E. LEE, MD: You can see right now, he's putting the cement on the components. What you don't want to get is you don't want, say a layer of blood between the cement you've put on and this component. So by doing it the way he's doing it, you minimize that.

00:58:52

GRETCHEN KANEB, MD: Again, he's going to pound that on.

00:58:53

DANIEL E. LEE, MD: He's going to pound that on. That's the brutal part of orthopedic surgery. Then, he'll remove the cement around peripherally, after he impacts it one more time.

00:59:09

GRETCHEN KANEB, MD: So, if any of our viewers have any further questions, he's almost finished with this procedure, so if you have any further question, don't forget to send them on to us.

00:59:19

DANIEL E. LEE, MD: We have one more. As we said earlier, he is not going to replace the patella. That's a variable decision, just depending sometimes on the orthopedic surgeon's clinical preference, and often after he or she evaluates the condition of the outer surface of the patella. You can see the very shiny surface, that cobalt chrome-moly surface, which is highly polished. The reason it's highly polished is you want to have the least amount of friction, because friction or scratches on the surface – You're always being very careful. You don't want to put any scratches on the component, because that will decrease the longevity of the component.

01:00:08

GRETCHEN KANEB, MD: And we talked that that glue also has some antibiotic in it also.

01:00:11

DANIEL E. LEE, MD: This one has a common antibiotic called gentamicin and it's a safe antibiotic that has a wide range of killing of bacteria.

01:00:21

GRETCHEN KANEB, MD: Now, is he checking...?

01:00:24

DANIEL E. LEE, MD: Now, he's already put in his poly. He's got a little gun and there's a little lip on the tibial component. This is going to push it and cement it down, so that sort of clips it in from the sides. He'd already trialed and he was happy with the ten-millimeter component, so I imagine that's another ten-millimeter component. He's checking on both sides. He's taking again. Typically, you check and check because you can still change that polyethylene out.

01:00:49

GRETCHEN KANEB, MD: There he's looking for...

01:00:50

DANIEL E. LEE, MD: You want a little bit of play, like he has from side-to-side. It looks like his alignment is excellent. The knee is very straight. You want to make sure that your kneecap is tracking well. After he checks that, he typically will hold the knee at what we call full extension, like he's doing now, and now we'll actually put a little pressure on the components to squeeze and really get that cement to really go into the bone surface. So, what he's doing now, he's checking on some of his data. As you can see, he's flexed the knee way back, 135 degrees there. So he's got excellent flexion. We consider anything pretty much over 100 degrees a high success, so it's really got great. He's got complete extension of the knee, so those are two motions, extending the knee and straightening the knee out, it went up to zero and that's considered full extension, and then full flexion. 135 is considered full flexion.

01:01:44

GRETCHEN KANEB, MD: We're going to squeeze one more question in here. "How do you know if your glue becomes loose?"

01:01:48

DANIEL E. LEE, MD: Great question, and it can do that. Typically, what will happen is, you'll develop what we call radiolucent lines, and what that means is your physician can take x-rays in his or her office and you will actually see a dark line

between the bone and the cement. The cement has barium in it also, so it shows up very white on the x-ray, so you'll actually see a dark line between the component and the cement, or between the cement and the bone. So, Bill, are you happy with it? Right now, he's washing again, and this is a constant washing, washing, enough to get debris out as we said earlier, and also to help prevent infection. The device you use is called a Pulsavac and it's a battery-powered device that takes sterile lactated Ringer's solution, some physicians put bacteriostatic fluid in there, but this is lactated Ringer's and it blows it on there like a WaterPik and it sucks it back out.

01:02:50

BILL DEVAULT, MD: All right. It looks good. Can I have you hold the main extension while it's hardening and I'll go ahead and take the sensors out. Do you have the screwdriver for the sensors?

01:02:59

DANIEL E. LEE, MD: So the sensors he's talking about are the devices that allow for the computer navigation. So obviously at the end of the case they're not needed anymore, they're not there, not left in place. Bill, that looks like a great job.

01:03:13

BILL DEVAULT, MD: Thank you. Yeah, I think she'll like this. Maybe just in time to do some Christmas shopping.

01:03:25

DANIEL E. LEE, MD: That's great.

01:03:29

BILL DEVAULT, MD: Yup.

01:03:30

DANIEL E. LEE, MD: Now, do you typically get your patients up right away?

01:03:35

BILL DEVAULT, MD: I'm sorry. I couldn't hear you very well.

01:03:36

DANIEL E. LEE, MD: Do you get your patients up walking on their new knee right away?

01:03:40

BILL DEVAULT, MD: Yup. Especially since we've cemented it. She can start getting up for therapy tomorrow. She's had a total knee replacement on the left and has done very well from that so I'm sure she'll bounce back in a hurry with this knee. Nothing much will hold her down.

01:04:02

DANIEL E. LEE, MD: Let me ask you one final question here as we begin to wrap this up. Do you typically use a CPM machine, what we call a continuous passive motion machine, for your needs or not? I don't think he heard me. I'll comment about that. Some physicians use them and some don't. It's a machine you put the leg in and it actually moves the knee for the patient back and forth.

01:04:26

GRETCHEN KANEB, MD: Would you typically use that just after the procedure or...?

01:04:28

DANIEL E. LEE, MD: Just after the procedure. I typically don't use it unless I feel a patient might have a weakness in their leg or they might not be motivated enough to do it, or if they've had a previous knee surgery, they have a lot of stiffness from that procedure. Bill, do you have anything? We're getting ready to wrap up. Do you have anything final you want to tell us about navigation? It looked like you did a great job.

01:04:52

BILL DEVAULT, MD: Thank you. I'm having a little trouble hearing you.

01:04:58

DANIEL E. LEE, MD: Do you want to say any final comments as we wrap up about how it went or about computer navigation?

01:05:03

BILL DEVAULT, MD: I'm sorry. I can't hear you very well. I think my earphone came out. Yeah, we're about ready to get her all sewn up. Her patella tracks well. I think she'll do real well.

01:05:19

GRETCHEN KANEB, MD: One more wash out. And then he'll close, probably.

01:05:22

DANIEL E. LEE, MD: I still want to add, about the computer navigation, it's a great adjunct to decision making, but it doesn't replace. It doesn't do the surgery for you. It just is an adjunct to help. As you noticed Dr. DeVault very wise and carefully, you check behind that. Even though that's a good guide. So it doesn't do the surgery. It doesn't replace good decision-making, but it's a nice adjunct and a nice new technology that's available at St. Francis Hospital.

01:05:55

GRETCHEN KANEB, MD: We talked about too when they go back to their room, starting on blood thinner. We usually start them on blood thinners to prevent blood clots.

01:06:01

DANIEL E. LEE, MD: We typically start them on blood thinners that night and the next morning and there's always debate. If we give them too much blood thinner, they bleed more. If we don't give them enough, they're at more risk. There's certain body types. People more obese are more at risk for blood clots. Well I think we're about ready to wrap up. We really appreciate everyone's attention and we appreciate Dr. DeVault's good work and we hope that his patient has a speedy and uncomplicated recovery.

01:06:25

GRETCHEN KANEB, MD: Thank you all for joining in.

01:06:31

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01:7:08

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