

## **Minimally Invasive Lumbar Discectomy January 28, 2009**

Welcome to OR live. I'm Dr. Sean Kanniff. To today you're joining us at Miami's Baptist Hospital. You're going to be seeing a procedure called a "minimally invasive microscopic lumbar discectomy." Now this is a patient who a 46-year-old woman who had a history of low back pain for about two months, and it didn't get better with conservative treatment. She tried medicine and physical therapy. Her MRI revealed that he had a herniated disc at L-5, S-1. So that's why she's having this procedure.

The man who is doing the procedure is Dr. Sergio Gonzalez-Arias, who is joining now. He's the chief of neurological surgery here at Medical Baptist and the medical director of the Neuroscience Center. So tell me a little bit about this procedure? How unique is it, and I understand you have an animation for us.

Yes, I do. In this animation you're going to see exactly what we're going to be doing in a few minutes. Lumbar surgery, particularly from the micro-lumbar discectomy style, it is a very common procedure. Many patients throughout the country and the world have herniated discs and require procedure. For many years we performed the traditional conventional surgery, which required a larger incision. When you have a disc herniation, your nerve that is at the area where the disc is protruded is irritated, and that creates significant pain that can be both in the back and down the leg as it is in this particular patient. The part of the disc that herniates is the center, called "nucleus" that comes through the harder outside part of the disc and compresses the nerve, as you see in this.

What causes that? How did that tear occur?

Well, what happens is as a disc starts losing water components and it degenerates, the outside wall becomes brittle, and it's easier for the softer inside to pop through. And what we do in surgery is literally go in there with the smallest possible incision to minimize the injury to the tissues, particularly the muscles, the skin, and the ligaments, to get to that area where the herniation is.

Here in this animation you see one skin incision, which is much less than an inch. Here it's centimeters, so it's less than two centimeters that is performed right at the midline, right over the vertebra that has the disc herniation. We then proceed inferiorly toward the disc herniation, as you'll see, and remove the disc herniation, which, in turn, relieves the pressure on the nerve, and this is what gives patients immediate relief. Here you see compression of the nerve with the irritated nerve looking red because it's irritated. I wish in real life it looks like that, but it doesn't. And what we do, as you'll see, through very small incision, we remove very little amount of bone at the vertebral level, which allows us to then have direct access to where the nerve and the disc is. It's a very small incision, very small approach, as you will see in a few minutes. We mobilize the nerve and remove the disc fragments, which obviously relieves the pressure, which results most often in complete resolution of the pain, particularly the one that's traveling down the patient's leg.

Now these are really specialized instruments to get in there; correct?

Yes, it is. We use instruments that allow us to access the spine through very small incisions. Traditionally there has been excellent instrumentation performed for this, but we

here at Baptist actually have perfected certain instruments that allow us to even have excellent approach to the spine through very minimally invasive approaches.

Now you develop -- now usually they use a series of dilators to get to the surgical site. You developed your own retractor?

Yes, I did. This is an excellent retractor that's used throughout the world for this surgery. But I found that the circular opening of it really limited my ability to use my hands as a traditional surgical instrument. It forces you to work within the diameter, so I developed -- adapted some of the instruments that we have to allow me to use my hands in the traditional surgical way, still through a minimally invasive approach.

And tell me a little bit about the microscope. I just want to touch upon that. You actually can see in 3D.

Correct. One of the greatest advances, at least in my specialty in medicine, has been the ability to use surgical microscopes. Working in magnification allows us to see the anatomy much better. We can control bleeding much easier, and it limits the damage to the tissues around. So it's a much safer procedure for the patient. There's a lot less pain related to the patient, a much more rapid recovery returning to their routine lives much quicker than the way we used to do it when I was a younger man.

And speaking of the patient, the patient is going to be coming into the OR very soon, so we're going to take it to the OR in just a few moments, so stay with us OR-Live.

Okay. Dr. Sean Kanniff from Miami's Baptist Hospital. And as you can see, the operation, the minimally invasive lumbar discectomy, is also underway. I want to remind those of you that are watching us online that you can at any point during this operation, send us an e-mail with your questions right directly to the operating room where we can answer just about any question with low back pain or about this particular procedure or other procedures or other options for back pain. But at this point, just by clicking on that button you can send us an e-mail right to OR-Live. Let's check in Dr. Sergio Gonzalez-Arias and see where he is in the operation, along with his north surgical team.

Well hello everyone. Actually, as you see, we've started the procedure. I put the screw there so you have a sense of the size of the incision, which is just a little bit more than half an inch. We are now at about 16 times magnification, and we're actually going to be working at even a higher magnification as I approach the surgical site. So I'm going to redirect my microscope and zoom it up to my level of usual distance of working and get it in the right position.

As Dr. Kanniff said earlier, we have a patient with a disc herniation on the right side at L-5, S-1, which is the most common disc herniation, and it creates severe pain not only in the back but often down the right leg, which was very debilitating for this patient that was unable to work or walk actually, being bedridden for the most part. So this is the bone right above. This is the L-5 lamina, the inferior aspect, and we're going to trimming off, as you saw in the animation before, part of it, and proceed to the yellow ligament, remove that, and approach the herniation and the nerve that's being compressed by it. Drill please.

Okay. Now I'd like to answer a viewer e-mail here. What are the main differences between this minimally invasive approach in terms of, you know, effectiveness of treating lumbar herniations?

Well, the minimally invasive approach really, all it means is that we use the smallest possible approach with the least amount of tissue disruption to approach and perform the necessary surgical steps to relieve that patient's symptoms. So, really, we do pretty much the same thing we've always done to relieve the pain by removing the fragments of disc that are herniated, but we do it through a much smaller approach, which translates into easier recovery for the patient. This patient will be going home in approximately three to four hours after she recuperates from the anesthesia and walks and has some fluid and goes to the bathroom and can go home, and there's no pajamas or bed rest required. As I always tell them, regular clothes like a leisure vacation for a few days until I see you in the office and make sure that everything is healing nicely.

I'm removing, now, the remaining part of the bone to allow me to get inside the canal where the disc herniation is. These instruments, the tip of this instrument is approximately two millimeters, so you can appreciate the degree of magnification that we're working on.

Yeah, I'd like to remind everything throughout this procedure, it's going to seem a lot like -- it's going to seem like there's more blood than there actually is, and it's going to seem like the manipulation of the instruments is a lot more forceful than it is, but we're working in a very small area here. Dr. Gonzalez-Arias is working in an area that is more narrow than an inch, so although it seems like there's going to be a lot of blood with this particular operation, what you're seeing on the camera, that's really not the case. Can you give us any idea Dr. Gonzalez-Arias about how much blood is lost during a typical operation during this non-invasive sort of approach.

The word that we put in the operative record is minimal. We're talking about maybe often less than one CC of blood. You're just seeing a lot because we're working right now at approximately 20 to 25-percent magnification, 20 times magnification, so it's minimum blood loss. And in the ten years that we started doing minimally invasive procedures here at Baptist, never has a patient required a transfusion, and the only times that they have had to stay overnight is either that we're doing too many cases and, well, they're late so the patient, rather than discharge them at 9:00 o'clock at night, we obviously leave them and have a comfortable evening and go home after breakfast the next day.

All right. And it's often a joke in neurosurgical circles that the blood drawing that you give, actually before you have the operation to make sure the best of you body systems are okay, is actually more blood than you lose, a lot more blood than you lose during the operation. Isn't that so?

Yes, that that's exactly right. What I'm putting now is a little anti-coagulating actually. It help us control the blood with this little powder that has -- it's soaked in a substance that immediately stops the little bleeding from the crevices of the bone and allows us to access the surgical site with greater ease and less bleeding. So actually I want to put a little bit more on top here.

Okay. Is there, you know, with this particular operation, I mean in terms of recovery time, what are we looking at compared to the more traditional discectomy? I mean what would that typically entail?

Well, as I said before, there's no bed rest. It's immediate return to daily activities. Depending on the type of job that the work environment, they can go to work right after I see them in the office, which often is as quick as five days to seven days. And I just like them to have normal movement without having to sit for a long time or -- pick ups -- or

stand for a long time. But rather using their backs regularly so the muscles heal with normal movement.

Now the traditional discectomy that was done in the past, though, involved a lot of muscle cutting, and that would lay people up for, you know, several days inside the hospital, and then you would also have weeks or sometimes even months.

Yeah. Those days, I think, for the most part, are gone in most centers that are performing this surgery on a regular basis. I think most of these types of procedures now at most is one day in the hospital. But, you know, we perform approximately close to over 250 of these procedures here at Baptist between the neurosurgeons that work here and myself. And the vast majority of them are same-day surgery.

Speaking of which, I wanted to say that you're not working alone here; that you are working with Dr. Daniel Sagee, also on the neurosurgical team here, who is assisting you in this operation. How important is it, do you think, to go to -- some of the minimally invasive techniques have been around for a while, but the learning curve is quite steep. It takes some specialized training. How important is it to go with -- go to a surgeon for these types of problems that is familiar with these types of operations?

Well I think that certainly every patient should be educated in where they're receiving their treatments and the indications for the treatment and the risks of the treatment, and they should ask what type of procedure specifically, what options there are, and make the best treatment decision for yourself. You know you talked about -- I want to go back to a point you made because obviously the surgeon is sort of the person that everybody focuses on. But minimally invasive surgery can only be performed if you have a true team of professionals that put together the entire ensemble required to deliver the care we provide.

You know, besides my valuable colleague, Dr. Sagee, who helps me in every surgery, we have our scrub, our technical team, our surgical technologist, Diana Diaz, and our nurse, Lisette Whispy, that are part of the neurosurgical team in the OR. We have the privilege of working with a group of nurses and scrub technicians 24-hours a day. So whether it's an emergency in the middle of the night or whether it's elective surgery, we always work with the same team that is part of our neurosurgical team, which is incredibly more efficient, and more importantly, safer for the patient, because everybody knows how we all work and what equipment is needed for the different procedures.

At this point, I just want to talk a little bit about low-back pain and how common it is in the United States of America and throughout the world. It's one of the most common injuries and one of the most common causes of disability in the United States. In fact, the only thing that keeps people out of work more than low-back problems is the common cold, so that's the kind of toll that it takes on people and the economy with lost workdays and also, needless to say, the pain. The good news is that most people with back pain will heal. These are back sprains or, you know, they twist wrong. It's not always a degenerative disc disease or some kind of other disc problem and it doesn't always need the surgical remedy. There's a lot of options that are out there.

Dr. Gonzalez-Arias, how many people would you say actually out of all people with low back pain -- are we talking about the minority that actually require surgical procedure?

Oh, the vast majority of patients that present with back pain, whether it's limited to the back or even traveling down the lower extremity, do not require surgery and will heal with appropriate conservative treatment; however, the group of patients which is really probably

less than one percent of the total patients that would present with back pain. I mean most of us will have back pain at least once in our life, so it's a very common presentation. But the patients that do benefit from surgery, particularly for this surgery, are those that have failed the standard conservative treatment modality, but more importantly, those that have a neurological deficit, which is the common presentation.

At the end of the day, the nerves that are getting compressed really are like cables, and there's a short circuit in the cable of the nerve when it's compressed and that leads to weakness and numbness and changes in reflexes, and those are the patients that if no improvement that rapidly ensues are best candidates for this type of surgery. Right now we're approaching the nerve that's being compressed. This here is, believe it or not, that white structure is a very thin nerve that is being compressed. And as you saw in the animation, I'm going to try to get around it and separate it to get to the disc herniation.

So that white structure, the band-like structure that we're seeing there sort of the in the lower left quadrant on the screen, that's the nerve, and you you're trying to move it -- position it out of the way it looks like. Now a lot of times when you do this, how evident is the extruded fragment of the disc. Does it pop right out at you? Do you have to go fishing around for it? Is every case different?

All of the above. It's very difficult to predict specifically whether you're going to find a large fragment by itself and you take that out and everything is done, or whether you have to start dissecting. Right now I'm taking a little bit more off because the compression is quite severe and I don't want to put undue pressure on the nerve to retract it.

People always ask, and we have a couple remains about the actual disc herniation and degree of herniation. You know, throughout your lifetime, you know, a lot of people are going to develop degenerative disc disease that can end up leading to some of these disc herniations. Sometimes they're very mild herniations. Sometimes they jut to the side. Sometimes they jut back. Sometimes large herniations don't cause any symptoms, and sometimes small herniations can cause very painful symptoms. So when do you decide as a neurosurgeon, you know, you say with a progressive neurological injury symptoms, like are they getting weaker, and when do you decide to go and decide to wring your hands that conservative therapy has not longer been effective?

Well the patient is followed clinically and we, after a course of physical therapy, appropriate anti-inflammatory medication, even depending on the situation of the patient, even consideration for epidural blocks or whatever other modalities we can use, the patient does not improve and we have on the MRI study a demonstrable compression of the nerve, which correlates to the physical exam findings, those are the patients that should be considered for surgery.

So while you keep trying to get at the nerve and the disc fragment in there, there are some questions about symptomology, like, what are the symptoms of low back pain? How do you know that you have a herniated disc, and you really don't. You know, if the back pain has been persistent and if it radiates, particularly down the leg, sometimes the higher disc herniations, L-1, L-2, L-3. Sometimes they can radiate to the groin area as well. The lower ones go to the anterior thigh and then all the way down the leg. It's difficult to tell, but that's suggested to us neurologists and neurosurgeons that there might be a herniated disc. Other signs include numbness in a discreet area on the leg, and sometimes the pain is described as, you know, an electric-like sensation and unremitting pain that shoots down the leg. Sometimes it's described as cold or even hot. It can get worse with prolonged sitting or prolonged activity. Sometimes twisting could exacerbate the problem, and

laughing or coughing, things along those natures sometimes make the pain worse. So those are all things that we take into account when we ask a patient about the type of pain that they're experiencing that there might clue us in that there might be some type of nerve compression on one of the lumbar nerve roots.

But without getting some imaging studies, you're really not going to know for sure. Even your doctor won't know for sure. He'll have a good inclination as to what's going on, but he really needs imaging study, and that really, today, relies on an MRI. There are some people who can't do an MRI because they either have a pacemaker or some other medical device or sometimes they're too heavy to actually fit inside the MRI. But MRI is really the gold standard for diagnosing these types of conditions.

What do you think some of the advantages of the advent of the MRI, Dr. Gonzalez-Arias, and how good are they at seeing these disc problems?

Well I think the most important thing is the physical exam and your doctor knows you better than anybody else to know whether something is going on or not. With respect to the diagnosis, without a doubt the MRI, a good quality MRI, which is very important. We very often see patients that present to us with MRIs that are not of the quality required to make an appropriate diagnosis. And that, by far, is the best option that there is for making the diagnosis. Right now I'm trying to mobilize the nerve here, which is giving me -- making me work.

Uh-huh. Yes. A lot of times it can be adhesions with continued inflammation, and that patient, she's a 46-year-old woman. She's had about, since about October, so for a few months, she's had a progressive lower back pain that radiated down her right leg, but the pain had gotten so bad that she was developing weakness in the right leg and she was actually confined to a wheelchair and could no longer go to work. And, you know, that's a very common situation, a very common story that we hear.

Right.

With that kind of chronic inflammation you can get adhesions though, and that can make the mobilization of the nerve a little more difficult. Is that what you think is going on?

Well I think what it is is she's got such a degree of compression that, you know, I don't want to damage the nerve root as I mobilize it. It's really the disc that's pushing on the nerve that is preventing me from mobilizing. Normal nerve root would be very easy to mobilize, but it's being compressed from the front, so that's the limitation that, you know, you have to be very meticulous about that during this part of the surgery to make sure that you're gaining appropriate room without putting undue pressure on the nerve.

Yeah. How big is this fragment that you're talking about? How big is the disc? How big is the disc herniation?

Well it depends. I think this disc is probably about a centimeter-and-a-half to two centimeters. The question is whether it's going to come out in one piece or not. It depends on the actual consistency of it, whether it herniated as one piece versus multiple pieces. Can you move the microscope there.

So we're looking through the microscope now just to give a better view.

To remind our viewers the white band-like structure when they suction a little bit of the blood out of there, is the nerve, the nerve root that's actually being compressed and Dr. Sergio Gonzalez-Arias is trying to mobilize it so he can get behind it so he can get at the herniated disc. It might seem like -- like I said, we're looking at 20-times magnification. The operative area, the field that they're working is actually smaller than an inch, so everything you're seeing seems -- the movements seem a lot more blunt and traumatic than they actually are, and it's important to mention that the nerve has a sheathe around it. It's the dura, and it can actually take a little bit of manipulation. And, again, just remember you're looking through 20-times magnification. The movements that you're seeing are actually very, very fine in real life.

All right. So we have a small Garrison. So we're close to getting to the disc now. This is all -- you saw the yellow ligament, which is a part of the ligament that unites one vertebra to the other, the one above from the one below. And we're now close to getting to the disc. I can feel the disc under the nerve.

Is that usual that you feel it?

Yeah, that's right.

Now do you see any signs that you've been successful? Once you decompress and you start cutting out some of the disc is there any signs? Does the nerve start pulsating again?

Yes. The goal is to decompress the nerve and be able to mobilize it appropriately. The nerve has its own blood supply, and it's living tissue just like everything else inside your body, so a lot of times when a disc is pushing on it, it will actually decrease the blood supply to the nerve, and that's actually part of the pain and what causes the pain. It's not just the mechanical force of being compressed, but it's actually a decrease in blood supply to it too, and that's probably what results in long-term complications when people have these kinds of problems and they don't rectify it or a surgical operation isn't done immediately and they let it go too long, Dr. Gonzalez-Arias, do you think is it ever too long? Let's just say a patient had a three-year history of this kind of problem and didn't want an operation, obviously the prognosis is better for sooner.

It depends on the patient's condition is at that time.

So it's never too late? If you still there's function --

It's never too late, and it depends who the patient.

Okay. Well we have a question from e-mail about why do discs dislodge in the first place, and really, that's kind of a loaded question. There's a whole bunch of reasons that this happens. You know, there's really nothing you can do to safeguard. Probably the biggest risk factor, although we see plenty of these problems in very young patients, they tend to happen more often as we get older, and there's a variety of changes that go on inside your spine, in the mechanics of your spine as you get older. First of all, when we're younger, the way the spine works is that most of the weight, the load of weight is carried on the anterior aspects, the front aspects of those vertebral bodies, but as you get older, that weight differential actually shifts more towards the back, so where the front and the back kind of split the weight a little bit evenly, and that's probably adding to the problem. But a bigger problem is the actual disc itself.

The disc is made up of, you know, collagen and collagen-like fibers that hold in water, a lot of water. And it's about 70/80-percent water. But as you get older, that disc actually loses

its ability to hold onto that water and it starts to dry out a little bit and it loses some of its volume. When it loses some of its volume and becomes more fibrous, that's where parts of it get a little bit more likely to break apart. But those discs, the nucleus pulposus is actually surrounded by fibrous tissue, and that fibrous tissue can tear, and that's actually what can lead to these extrusions. So what really causes it? Well age is definitely a part of it. Most of these problems don't arise from car accidents or --

Here's the disc, Sean. I want to show it to you.

Oh. Sure.

There's the disc coming out.

Oh, big fragment.

And usually after we take the disc out, there's a lot of normal veins that are between -- that normally exist in the lumbar spine, and when we take the large disc out, we often see bleeding because you decompress the nerves.

That was a large fragment. Give us a rough -- measure that. About how big was that fragment compared to other ones you've seen?

That's about a centimeter-and-a-half.

They may be wondering about the consistency. People often say like it's sort of like scallop meat or crab meat.

Crab meat is a very good description. You know, herniated disc is really like a -- I hope the audience can appreciate this vein. They look like large veins, and they're really, believe it or not, they're very small. They're like one or two millimeters at most.

Right.

Those are the ones that get compressed.

Yeah.

A disc, as I was saying -- you were asking me -- a disc is like a jelly donut. It's soft inside with a hard outside. It's really not jelly. It's like crab meat. But consider -- think about having a disc that has like a hard outside surrounding a soft inside. And what happens is that as we get on in life there's degeneration that normally occurs in all of us, and sometimes that leads to some breakdown of the outside wall of the donut, if you want to call it, or the disc, thereby allowing the soft material to extrude. And when it extrudes next to a nerve, it creates a significant painful syndrome, particularly down the leg, down the lower extremity, which is very debilitating. And the moment you relieve the pressure in the vast majority of patients, you get dramatically better.

Woodson, please.

Yeah, let's talk about that. What is the post-op recovery like? I know that most patients go home the same day, but do most patients say to you, "Wow, I should have had this done sooner?" Is there immediate relief, and what's the risk of recurrence or recurrence of the pain with the procedure like this?

More disc coming out here. The risk of recurring is very small. But obviously whatever factors predispose us to have a disc problem or a back problem will be with us forever. So

there is very little that we can do to change the genetics, and if our family has a predisposition of back problems, which we often hear patients that come and tell us, my father, my grandmother, whole family have problems.

Right.

Well, probably just translates to not only a body habits, the body mechanics, the weight, the way we use our backs, the way that our proteins and our ligaments are formed, which could be more lacks than in other humans, and that's where the problem really comes in. And all you can do is once you have the surgery is optimize your physical condition. Most patients, like I say, get back to normal function and to the normal work as quickly as possible within a week or two after surgery for the most part -- and retractor -- and they got on with their lives never having a problem again. But there is always a chance that there would be further problems that are created that can lead to this.

All right. Over there, honey. Now I'm going to redirect the microscope. We're actually going to see here is further disc herniation. Woodson.

Now possible post-op complication of not only the minimally invasive approach but all of these lumbar discectomies is a hematoma, a post-operative hematoma, which could actually, you know, hurt the nerve in a similar way to the disc. So is a post-operative hematoma, given the operative field here is so small, is that less of an issue with these types of operations?

Hematoma is much less of an issue, particularly if you do meticulous hemostasis before you do your close. You make sure that you're well dry before you close. Infection is always a possibility in any patient undergoing any type of surgery, but we give antibiotics before, and the risk of infection is very low in these patients.

Now it seems like you're taking out multiple fragments and you're grasping another. Is that common? Are they typically very pliable like that in most people?

It's very common because most people -- see, here we go. They're very common to break up because of the size of the protrusion, so because it's being held down, it just breaks up. You can see here is a huge -- may have a Woodson, please. So this patient went into surgery unable to walk because of pain. She was having a very difficult time. And I am quite comfortable saying that she will be discharged with no pain down her leg once we're done with the complete decompression.

That would be a wonderful thing. Now we're doing just one level here. Can these same procedures be used to do multiple levels, and would you have to reposition the instruments?

Well, yes, it's not a rare situation to have more than one disc herniation. However, my experience, most often only one disc is the real problematic one. And often you may have a patient who has multiple discs, protrusions, little bulges, but one is the one that is creating the symptoms, and I always believe in doing the least amount of surgery, that's best for the patient want, so we only do what we need to to relieve the pressure. Woodson.

Now, we're looking at a minimally invasive lumbar discectomy. Lumbar disc problems are very common because the spine actually -- not only does it bear a lot of weight down there, but it's actually a very mobile part of the spine, and that's part of the problem. That's why they're so common, L-4, L-5, and S-1 are the most commonly herniated discs, and they're both in the lower spine.

Another part that is a problem is the cervical spine, inside the neck because that's also very mobile. Do you see a lot of problems with that, and can these minimally invasive procedures also be used for cervical spine problems?

Yeah. We perform micro-lumbar surgical procedures in the cervical spine routinely. These are procedures that are done for herniated discs, for bony spurs when they compress a nerve or the spinal cord, creating significant compression. And so also those patients we usually like to keep in the hospital over night, because when you are operating in the neck, we always want to be very safe and sure that no swelling will present. What I'm doing now, so we continue the surgery, before I keep talking about the cervical spine, now I'm entering the disc space where the herniation occurred from and removing any remaining chunks of disc that may end up protruding in the future. So we clean out, to the best of our ability, the disc and, in essence, that will be the procedure. We'll be -- as soon as we finish this, we'll explore. There may be some remaining chunks of this that we have to remove, and that's what we'll do.

So when do you know to stop, when you're in the disc space and removing some chunks, when do you know to, you know, okay, that's enough to take out? How do you know?

Well, you can palpate the disc and the nerve roots, and you follow the nerve root and you palpate, making sure that there's no other compression present. You'll see me doing that as soon as I feel that I have removed as much from the disc space as possible. We will explore the trajectory of the nerves and the trajectory beneath the sack where all the nerves are. It's call a "thecal sack, "which is just an encasement by the dura, which is the covering of the brain and spinal cord, and all the nerves are in their like a bunch of spaghetti. At each level, the nerve comes out on each side. So we make sure this there's no compression at any of those levels.

Now people often wonder, you know, especially when you're being operated on on the lower back, oh, what if they damage my spinal cord. There's essentially no risk of damaging the spinal cord from this type of operation. You want to tell us why that is.

Sure.

The reason is is because the spinal cord, the ends much higher up in the score. Most spinal cords in most patients end up at about the L-1, L-2 space, and beneath that is the structure called the cordi equini, which is the Latin term for the horse's tail. And they're using that term because the nerves look like the hairs in a horse's tail as they come down. And at each level, they exit to the right or to the left to become part of the sciatic nerve. You know one good important thing to talk about is the concept of "I have sciatica." We've always identified sciatica with pain down the leg, and that's a term that really was started a long, long time ago, and we can't break away from, but in reality, there's not such thing as sciatica in terms of anatomical terms, because the sciatic nerve is composed of the five nerves in the lumbar spine.

So when you have pain down the leg, it's usually for compression of one leg -- oh, I'm sorry, of one nerve, one of the five nerves that make up the sciatic nerve. So but we can't get rid of that term. We keep on talking about sciatic because the whole world recognizes it as pain down the leg. But it's just a little trivia information.

We have a question from the audience from an e-mail about trying to make yourself comfortable when you haven't had the operation yet. If you have a herniated disc and you

have intermittent lumbar radiculopathy pain shooting down your leg, what are some of the positions you can put yourself in? I mean is it the fetal position on your side? Is it laying on your back with your knees up? What do you think works best?

You know, most every patient has a different answer to that, and I just tell them to find the position that's most comfortable. And in general terms, sitting for prolonged periods of time is very painful for the back because you're increasing the pressure in the spinal canal with prolonged sitting. Come on out, Danny, let's check around. But most patients feel best when they're sitting with their leg flexed, by flexing the nerve they are eliminating the tension on the nerve.

Think of a disc herniation as the violin, the chords in the violin are kept taught by a bridge and you tighten them around them. So a disc is like the bridge of a violin, and the flexing your knee and your hip is like loosening the cord so you have less pressure, so you feel better.

Perfect.

Well we're just about done here. Let me have that, the small one. We've explore, I'm going to explore around the nerve again and get our hemostasis. Let me have the Woodson. We'll get hemostasis. See, this is the nerve root, and the nerve root is exiting here. You can actually see a curve as it's coming out.

Yes. Beautiful.

So I go underneath and palpate its exit, and I know that it's completely free, and here I am beneath the thecal sack, and that's where the perforation occurred.

It's a big difference palpating it between how you felt it just 20 minutes ago when you first in there?

I bet you I make a lot more sense that I've accomplished it than when I was trying to get around it. Yeah, it's completely different. It's completely free. I separated, and this operation, in essence, it's over, and we're going to get hemostasis and we're going to close the wound and let this patient wake up and have the first sign of relief for the last couple of months for her.

Uh-huh. Terrific. Now it's important to mention, most people are not going to ever have to resort to this kind of surgery. If you have a progressive neurological deficit, intractable pain, if you start getting weak and the weakness is not improving, or numbness, that's when you really want to involve a doctor early when you're having these types of symptoms. You really don't want to wait on it. But the good new is that most of these people are in the going to need this type of surgery, but if they do, the minimally invasive approach, you know, will, first of all accomplishes the same exact results as traditional discectomy but has a shorter recovery time and less post-operative pain, and really gets people back on their feet and back to their normal life much earlier than the traditional discectomy, and that's really the point of this surgery, right, Dr. Gonzalez-Arias?

Yes, sir.

It's to get people back to their normal life.

That's the most important reason to have surgeries, to be able to lead a normal life. And thankfully with the advances in technology and diagnostics that we have available here at our Baptist Neuroscience Center, we can offer that to our community and to ourselves when we need it any time any day in the entire year. You can see here that there is no bleeding, and now that we're accomplished our discectomy, you can see how the nerve is moving normally.

Yeah.

Our nerves normally move as we breathe and as our heart beats, and when it's compressed the movement is eliminated because it cannot move. It's got this knuckle of disc pushing it from below, but now you have completely normal motion of that root, and this is a very worthwhile and actually great response for surgery in this patient.

Now let's talk a little bit about other surgeries. I mean this minimally invasive approach doesn't only work for just lumbar discs. As we mentioned before, it can even work in the thoracic region and the cervical region. Thoracic is pretty rare because thoracic spine doesn't move. But you can do this minimally invasive approach for all kinds of other neurological problem can't you, with the back?

Right. I mean as I said early on, minimally invasive techniques just means that we are approaching the spine with the least amount of tissue damage that we can, that we need to be able to release the pressure whether it's a disc herniation or whether it is a bony spur, or whether it's a degenerative process that lumbar spinal stenosis, which is a very common problem that presents as we age, in which our canal becomes compressed like a napkin ring. And what we do, in essence, is go in the microscope and take off the back of the napkin ring, eliminating the pressure on the entire canal, which immediately improves the patient's ability to walk. These are patients that usually can walk long distances before having to sit down, and they love to go to the supermarket because when they lean forward on the shopping cart in the supermarket, they find some relief. The reason that happens is that you're leaning forward, you are flexing your spine, and you are opening the canal so you have transient improvement just because of your position.

Well, in essence, we've finished our surgery. And what we're doing now is irrigating the wound with antibiotic solution, and we'll be closing very quickly.

Speaking of closing up, I mean are there any sutures? Do you have to suture the muscle? Do you have to suture the skin? What's that? And do those sutures have to be removed?

We suture the -- the muscle has a covering. It's called the "fascia," and that is what holds the muscle bundles together, and we close the fascia, approximate it from one side to the other, then we close the fat pad that we have, and we then close the skin, placing what's call the subcuticular stitch. We don't have to remove sutures in the future. All these are absorbable sutures, and they have a dressing that they wear, and they can take a shower tomorrow and just change the dressing after surgery and usually take either Tylenol extra strength or some mild analgesic with some codeine or something along those lines if they have significant pain.

Women are much better than men tolerating pain. And that's just the bottom line, and I accept that. Being witness to whenever I've had any pain it's worse than my wife's or anybody else's. Well, as we're literally bringing this minimally invasive microscopic discectomy to a close, I just want to talk a little bit about the Baptist Hospital, well Miami's Baptist Hospital Neuroscience Center, where they have innovative approaches to all kinds of

neurological diseases, not just those involving the spinal cord. They do the brain and other aspects of the nervous system, and many operations like this, and all of them -- well not all of them, but through minimally invasive techniques are available. So if you want to consult with Dr. Gonzalez-Arias or any of the fine physicians at the Neuroscience Center, you can call the physician referral line. I'll give you that number. It's (786) 596-6557, or you can call toll free at 1 (800) 228-6557. And you know the referral service is absolutely free, so please call if you have any questions.

And now when it comes to this particular segment in this operation, you can find that on OR-Live where it will be their indefinitely on the site where you can always find it at this particular URL, and it will also be on BAPTISTHEALTH.NET. But a little plug for OR-Live I'd like to mention is that they have over 600 different operations that you can view, just like you're viewing this one, and so it's the world's leading broadcast center for operations. Even doctors learn from these things. So it's a really great site. Certainly if you're about to undergo a procedure, just about any procedure, check out OR-Live, and check out if the actual procedure is online like this one is going to be.

Dr. Gonzalez-Arias, what are we talking about with rehab? Do patients typically need rehab after this? You said they go back to normal activities. Can they hit the gym right away or do they got to --

Well, the best physical therapy to me in this type of patient is to carry out their routine daily activities in a normal fashion. There's nothing like using your body appropriately and normally to stretch the muscles and get them functioning back into normal style. So I do not routinely send patients to physical therapy. I am sort of -- I educate them prior to surgery in what I expect their activity levels to be and what they can do. The only things I tell them not to do is jog or any high-impact aerobics, and after I see them the first time, they can get back to their normal activities, including going to the gym.

And, you know, but I always warn them however, that if you have been in pain for months and you haven't been functioning and you haven't been going to the gym on a regular basis, you should sort of act like a baseball player in spring training. You train yourself for a while before you start hitting the machines and your exercise routine in your usual manner, because those muscles need to tone up again and get back to normal activity.

With one-third of Americans being obese in this country, how much do you think the obesity epidemic is playing into this. Are you seeing more cases due to the obesity epidemic, do you think?

Not really. Even though it would make all the sense in the world to think that there is a significant correlation, it's surely a contributing factor. But there are so many factors that come into play with respect to our spine and our function or our spine that to say that obesity itself is a single factor, I cannot say that.

I agree. I would have to say it makes intuitive sense keeping your weight low from what we know about the mechanics of the spine would probably help out.

Without a doubt.

But, you know, this patient right here that we're seeing and operating is absolutely not obese. Has a great shape, and here she is with a disc herniation, so it's multi-factorial without a doubt.

Perfect.

We're just about to put the final deep layer sutures, and then I'll show you with a ruler, again, the incision where we performed this procedure, and we'll be done.

Now a little bit more. I mean with conservative management, people think about taking the non-steroidal anti-inflammatory drugs, which work pretty well, and often these are combined with muscle relaxants, and that cocktail works pretty well for people. But some people actually go onto epidural steroid injections. How do you feel about them, and do they complicate the procedure at all?

Without a doubt, conservative modalities are indicated and very appropriate in all patients with their initial bout of painful discomfort. I think all the modalities that are available are excellent, including chiropractic care. I do not -- you know, for some reason people think that doctors, surgeons don't work with -- I think chiropractic care is very good in the appropriate patient, and patients do very well. However, if you have any weakness, if you have a sensation of numbness, if you have any change in your bladder or your bowel function that's new, those could be surgical emergencies, and those are the ones that should not be delayed in management.

So my best recommendation is if you have an onset of pain that you didn't have before, talk to your doctor. He or she will know the best treatment course for you and make sure that you get to the right specialist and the right place for your care to relieve your symptoms. Let me show you now, again -- pick ups, please. So here is the surgical procedure. We're just going to put the sutures now, and there is our incision with respect to an inch. So as you can see, it's indeed minimally invasive, very small, and patients have recuperated very well, and this patient will be very satisfied in about 45 minutes when the effects of anesthesia wears off and she wakes up. She's going to close the skin now and put our dressing on and we're finished.

Terrific. So when we're talking about back pain, you obviously want to present yourself from getting into the OR in the first place. And you really can't do much about some of the biggest risk factors over there, which are genetics and which are your age. As you get older, these things are going to tend to happen a little more. But I know everyone's trying to stay out, but there's plenty of options that you can. And how do you feel -- one of the options long ago was traction, spinal traction. Is that still being used? Someone wants to know from our live audience.

Sure. Sure. Traction is one of the modalities that is used in standard physical therapy. All traction really does is stretch the muscles, and as most often the people's symptoms that are afflicted back on the legs, as we said early on, are not related to any structural problems in the actual spine but abnormal muscle tones and contractions of muscles, ligaments, and tendons, which can create similar symptoms. And it is those patients that benefit tremendously from appropriate physical therapy, including traction as one of the modalities that's often used.

Some people are concerned that, you know, that the complications from surgery, I mean although this looked, you know, quite comfortable for the patient, but the complications of surgery, they're afraid to have an operation, but the medications that will be used to treat this even conservatively can have their own side effects. Isn't that true?

Of course. Side effects with prolonged use of anti-inflammatory medications can lead to significant gastrointestinal function and problems. Narcotic overuse can clearly lead to multiple problems, not just becoming habituated to their use. So the most important

message is that appropriate diagnosis with the right specialist and the right team of doctors and diagnostic equipment is what prevents a lot of the problems that can present from the surgical or any -- or nonsurgical treatment. So I would just tell the audience that the most important thing is God forbid if you have any pain in your back or legs, if you have it, take care of yourself and make sure that you're being taken care of at a facility that has the latest technology available for the diagnostic, the treatment, and the possible surgical procedure that you may need to ensure that you have the quickest return to your normal activity in the safest fashion.

Now would you say -- I think it's important to stress here that the effectiveness of this procedure is about the same as the traditional approaches. What's really excellent about these types of procedures is you have a quicker recovery time, less blood loss, and less post-operative pain. You get back to your normal life quicker in a nutshell. But you're effectively doing the same exact job; right? This isn't superior to a traditional discectomy.

Absolutely not. This is at the bottom of the surgical procedure, which is actually where the actual work needs to occur, which is the relief of pressure in the nerve, you accomplish that just as effectively with a standard approach. The difference, as you alluded to, however, is that the recuperation is much quicker.

So if there's someone out there who is a surgeon, a neurosurgeon or orthopedic surgeon, wants to do the standard approach, would you say that if he's a trusted neurosurgeon going with that, or should patients be seeking out versed in the minimally invasive procedures?

The most important thing is to have a good trusting relationship between your surgeon and yourself, and you need to establish that before you go to surgery. So if you happen to be able to develop that type of trust once you've been referred to a surgical specialist and you can do that having a minimally invasive approach rather than a large approach, obviously that is better for you in terms of recuperation, but by no means can that supersede the relationship between the physician and the patient.

So it looks like you've moved the microscope away. Are you finished with the entire operation?

Right. We're finished with the entire operation. Dr. Sagee is putting the final sutures in the skin. And we are done. She'll be waking up in the a few minutes, and we'll be seeing her in recovery, like I said, in about half an hour, 45 minutes, once she she's stable, she should be fine.

Well if you want to have any consult with any Baptist Hospital doctor in Miami, you can dial (786) 596-6557 and if you're outside of the area you can call toll free 1 (800) 228-6557 to get a physician referral like Dr. Sergio Gonzalez-Arias right here. So let's try to recap here. Let's talk a little bit about the actual causes of back pain. Let's start at the very beginning. What are the signs and symptoms and then let's go to the causes? So what are the most common causes?

The most common cause of back pain is muscle or ligament related symptoms. The next is going to be whether you have a disc herniation or a structural problem. If you have a disc herniation, it usually occurs either the left or the right side, and the most common symptoms are pain radiating down the lower extremity on either side, depending where the disc herniation is, associated with possible numbness or weakness, changing in reflex, and obviously only a doctor is going to examine. So if you have unexplained pain down your

legs, your back, either leg or both legs, you should seek medical attention and make sure that you get into the right hands and the right place for your care.

Okay. So you go to the doctor, and they say all right we want to -- they manipulate you, they do all kinds of physical examination on you and they send you for what? What do they do? What is the typical work up?

Once the patient goes through an initial treatment modality, there is no neurological deficit. The next thing would be a diagnostic test, and an MRI is by far the gold standard for evaluation of the lumbar spine.

Okay. If they can't have an MRI, is the CT myelogram still in use?

Very rarely. We have not performed the myelogram here at Baptist Hospital for many years, except in very rare occasions in patients who have come to us with having had multiple operations in the past that we need to have much more detail information than we can see because there's scar tissue and other problems. But for the most part, MRI is by far the only test which is noninvasive. The days of daily myelograms are far gone at our facility.

Now an important -- before the pre-op, which we didn't show on OR-Live, was how do you even know that you're in the right place? You use something called a fluoroscope, is that right?

Well, when we first make our approach to the patient, the first thing we do is obtain a lateral x-ray with a marker placed on the patient's skin so we know that we're cutting exactly in the area that we have to. We have very little room if we're going to make a small incision, so our failure rate has to be very, very small to approach it, so we get an x-ray, we localize it, and then we proceed based on that. And once we're inside, and we put our retractor right before we started the surgical part of the procedure today, we obtain a second x-ray with the marker at the disc level to confirm that we are, indeed, in the right position, thereby being a safe procedure.

Okay. So then you cut the skin. It's less than an inch, about two centimeters, a little bit less than that.

It's less than that. This was about a centimeter-and-a-half.

Right. So then you go in and you use a special retractor that you developed yourself to actually dissect away the muscle? I mean do you spread the muscle? Do you cut into it? What do you actually do?

We do not cut the muscle. We actually separate the muscle and spread it away from the spinal column. And what I did is that I adapted a certain instruments to allow me to do it through a small incision but give me the complete freedom of my hands as opposed to having to work through a tube, which forces you to work in a parallel fashion, which is not the traditional position for the surgeon's hand.

Right. And obviously it's very important that you're not cutting that back muscle, resulting in better recovery.

That's exactly right.

Okay. And the studies, do they support that, do they show that quicker recovery times, cost effectiveness, and is this covered by insurance?

Oh, it's covered by insurance, and it's great for the patients, and, indeed, it's better recovery, and they do very well.

Again, if you want to have any consults with the Baptist Hospital, with a doctor at the Neuroscience Center at the Baptist Hospital, just call 1 (800) 228-6557, and you can always check out this operation and 600 others at OR-Live. Live from Baptist Hospital's OR, Dr. Sean Kanniff, joined by Dr. Sergio Gonzalez-Arias.

It's a pleasure.