

INTERDISCIPLINARY TEAM PRESENTS SPINAL MICRDISCECTOMY  
ST. MARY'S HOSPITAL  
MADISON, WI  
May 13, 2008

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ANNOUNCER: Welcome to this OR-Live webcast presentation, live from St. Mary's Hospital in Madison, Wisconsin. During the program, it's easy for you to make referrals, make appointments, or request more information. Just click on the buttons on your screen and open the door to informed medical care. OR-Live: the vision of improving health.

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ALAN P. LOZIER, MD: Greetings, ladies and gentleman, and welcome to St. Mary's Hospital in Madison, Wisconsin. Over the next hour, you'll be hearing Dean and St. Mary's spinal surgeons performing and discussing a microdiscectomy surgery. I'm Dr. Alan Lozier, and I'd like to introduce our panel. To my right is Dr. Lee Carter.

00:01:02

RICHARD L. CARTER, MD: Good afternoon.

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ALAN P. LOZIER, MD: We also have Dr. Keith Kahle, of orthopedic surgery, and Dr. Todd Trier of neurosurgery.

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TODD T. TRIER, MD: Hello, everyone.

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ALAN P. LOZIER, MD: Shortly we'll be going to Dr. Masciopinto in the O.R., but before we do that, I'd like to take care of a few housekeeping items. If you have questions you'd like us to answer during the webcast, please submit that by pressing the MDAccess button on your webcast screen. Also, an archive of this webcast will be available for future viewing. Well, let's go to the O.R. and get an introduction from Dr. Masciopinto.

00:01:41

JEFFERY E. MASCIOPIINTO, MD: Good afternoon. Welcome to St. Mary's. We're in operating room 14, where today we have planned a lumbar five sacral one microdiscectomy on the right side. I'd like to start by thanking the patient, who was quite excited and very interested in participating in this educational opportunity. It was very kind of him to offer to be involved. Then I wanted to introduce our operating room team today. Mel is going to be our surgical technician. Lee Russi is a nurse practitioner at the first assist. Katie Miller is providing anesthesia. And Tom is our circulating nurse. We've already been in the operating room for about a half-hour. We've had the patient placed under anesthesia, and he is on the surgical table, which is a special padded frame on which he's lying face down. Then we've taken an x-ray to give us an idea where we should start with our incision so we can be very focused. And then his low back was sterilely prepped and you can see that he's been draped as well. So we'll be back in a few moments. We're going to start working in here.

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ALAN P. LOZIER, MD: Well, thank you, Dr. Masciopinto, for that introduction. I'd now like to go to Dr. Carter to give us an update on the clinical history of the patient.

00:03:02

RICHARD L. CARTER, MD: This is a gentleman who's had about a six-month history of predominantly right leg pain. He's been treated conservatively, which has included medications, physical therapy, chiropractic treatment, in addition to steroid injection therapy. This has included both epidural steroids in addition to a selective nerve-root injection, which is a specific CT-guided method to deliver steroids right to the suspected nerve root. And with this technique, he actually had significant reduction of his pain, so it did indeed confirm the diagnosis. His exam is consistent with compression of the S1 nerve root, which would give him pain down the right leg down to the foot.

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ALAN P. LOZIER, MD: Thank you very much for that description of the patient's clinical scenario. Now for a primer on the anatomy that you're going to see during the surgery today, we'll turn to Dr. Todd Trier, who has a model of the spine for us.

00:04:01

TODD T. TRIER, MD: Thanks, Dr. Lozier. This model of the lumbar spine will demonstrate the spine's processes. The incision will begin somewhere in this region. Dr. Masciopinto is operating on the patient's right side, demonstrated by this side of the spine. But for the purposes of seeing it clearly by the camera, I'm going to demonstrate on the left side. The lamina is this flat bone here that you'll hear referred to a number of times. The nerve roots exit through bony openings at different levels of the spine and for the purposes of this operation and demonstration, the herniated disc is at the L5-S1 level, compressing S1 as it goes past. And the compression, once again, is at this level, seen from surgeon's point of view. The trajectory that we're aiming for is going to be parallel to the disc space, about like this. Not all of the lamina is removed in order to get that preferred parallel-to-the-disc trajectory.

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ALAN P. LOZIER, MD: All right, thank you very much, Dr. Trier. Why don't we go to the O.R. for an update from Dr. Masciopinto as to where we are in the surgery.

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JEFFERY E. MASCIOPIINTO, MD: Well, we're just about to put our retractor system in, and our retractor is a bladed retractor. This will be used to hold the muscle back. So we have about a quarter-size opening that we can work down at a very perpendicular fashion, most commonly with the microscope. Currently I have some optical loupes and a headlight on, but soon enough I'll be removing those and we'll bring the microscope in and we'll be doing most of the remainder of the surgery under the microscope, and that's what you'll be able to see on the monitors. So in about two minutes we'll have the retractor in, and then we'll obtain an x-ray and we'll go from there.

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ALAN P. LOZIER, MD: All right, very good, Dr. Masciopinto. Why don't we bring Dr. Kahle into the conversation to discuss some alternative retractor systems that are available?

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W. KEITH KAHLE, MD: Well, Dr. Masciopinto is doing a microdiscectomy, and that's just a term that applies to a minimally invasive way to remove a herniated disc. As has been the case in so many surgeries across the board, the trend has been toward less and less invasive surgeries, and that has spawned the development of retractor systems that go along with these small incisions that we currently make. Dr. Masciopinto showed you a type of retractor. We make a small skin incision, but the

real dilemma is how do we get from the skin down to the area and see properly for the work we have to do. So the system that he's going to use today is a little -- a little blade system. There is -- there are other systems available. I just wanted to show you one option. I'll use this model here to demonstrate. Making the same small skin incision similar to the one that Dr. Masciopinto has made, we sometimes can do the surgery through a small tube device. This is developed by Medtronic, and it is called a METRx tube, and basically there's a series of progressively larger little cylinders that just slide down through the muscle and gradually dilate the muscle without actually cutting it. And then over that stacked set of cylinders, this working tube just slides over those, and it's attached to a clamp. Then we remove those stack of dilators and do the whole operation through a tube like this. So that's just another option, and there are many -- none are necessarily any better than another one. The other issue that comes up, though, is how do you now see down that little hole that you've just created? And Dr. Masciopinto actually is starting out his surgery wearing a microscopic set of lenses very similar to what we see on this picture and a head lamp, but as he gets down to do the work, he'll be using an operating microscope. Some people do this operation just wearing these types of head lamp and loupes, and again, there's no right and wrong way to do it, but you may find that different people will use different equipment in all these areas and still be doing what they would call a microdiscectomy.

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ALAN P. LOZIER, MD: Well, thank you very much. I think the one thing that's safe to say is using any of these techniques, we currently make very small incisions, and this facilitates a quick recovery for the patient. Why don't we turn to Dr. Carter now to explain to us what the indications for microdiscectomy surgery are in general.

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RICHARD L. CARTER, MD: In most of our patients, these will have at least six weeks of conservative management. So typically a patient who has back pain doesn't rush right to surgery, we will manage them conservatively. And 80% of them will actually get better without any surgical intervention. Those patients who ultimately fail management rules at some point will be referred to either an orthopedic spine surgeon or a neurosurgeon. We then would do an examination, and if the history and physical examination have appropriate deficits associated and those are correlated by an MRI that's abnormal, then those patients are felt to be very good surgical candidates. From an indication standpoint then I would hazard to say it's patient who have leg pain more than back pain, a patient who have already been treated conservatively, in addition to a patient whose neurologic abnormalities correlate with the appropriate MRI features. And that's very important because most patients over the age of 30 or 40 will have an abnormal MRI, so you have to make sure that the pathology that the patient exhibits on the MRI actually fits with his clinical syndrome.

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ALAN P. LOZIER, MD: I think those are excellent points, and Dr. Kahle, to that point, what percentage of patients would you say that come to see you with back pain or leg pain actually end up having surgery?

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W. KEITH KAHLE, MD: Oh, it's -- first of all, it's a very small percentage of people who have back pain that ever go to see a doctor in the first place. Most of these episodes that people commonly in the course of life experience will resolve without ever having to see a physician. Most people will see their primary care provider first, and then there's a referral pattern: if patients aren't getting better, eventually they may send a patient to see one of the neurosurgeons or one of the orthopedic surgeons. Even in that group of patients, there's really quite a small percentage of

people who ultimately need surgery. Probably less than 10% that actually come into my office.

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ALAN P. LOZIER, MD: Well, thank you for that. And I think, to that point, patient selection is really critical for a good outcome. We certainly can do lots of operations, but making sure we're doing appropriate operations is really the key to success. Well, why don't we turn back to the O.R. and get an update from Dr. Masciopinto as to where he is in the process.

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JEFFERY E. MASCIOPIANTO, MD: Well, we've just obtained our x-ray, and currently we've made an incision approximately two centimeters, or two quarters of an inch long. And we've placed our retractor on the right side. And a metallic instrument is in place just underneath one of the smooth bones on the spine called the lamina, and the x-ray in fact has demonstrated that we're at the correct level. And what that lets us do is start our dissection and approach to the spinal canal and to expose the nerve root and the herniated disc. So I'm going to be removing my headlight and magnification lenses, and we're going to bring in the microscope. And once that's in place, we should be able to give you a nice picture of what I'm seeing as I'm working.

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ALAN P. LOZIER, MD: Well, thank you, Dr. Masciopinto. As a lead-in to what we might see in this surgery, we have a short condensed version of a prior operation. And if we're ready, why don't we show that now. Here we see the operating microscope being brought into the field. The surgeon is looking through the operating microscope and using what's called a Kerrison rongeur to remove small amounts of the lamina. Now a high-speed pneumatic drill, a drill powered by air under pressure, is being used to remove a small portion of the bone. The bone dust is being removed with a sucker. And my assistant is irrigating some of the bone dust away. We create this small opening to enlarge the working space to have better access to the nerve and disc. The Kerrison rongeur is now being used to remove a small portion of the ligamentum flavum, a ligament that covers the contents of the spinal canal. In general, we try and remove as little of this ligament as possible to create an opening while not disturbing the normal anatomy. With the ligament removed, the disc herniation comes into view. Here a nerve hook is being used to mobilize the free disc fragment that's been extruded from the disc. And you can think of a herniated disc or a disc in general as a pillow and there is a hole in it with some of the stuffing coming through that hole. Here that stuffing that's escaped is being mobilized with the nerve hook. You'll now see a grasping instrument called a pituitary rongeur used to hold onto the disc and tease it out of that tear in the casing of the disc. This fragment of extruded disc was underneath the nerve and is what was causing the patient's pain. All right, why don't we go back to the panel for some questions at this point. Our first question from the audience is: how long do you try alternative treatments prior to seeking a surgical solution? And in part, I think Dr. Carter has addressed this.

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RICHARD L. CARTER, MD: Again, typically it's a minimum of six weeks. Not to say that patients have to rush to see a surgeon after that time frame, but a lot of it's predicated on if they're improving. If they continue to improve and even if they've had six weeks of symptoms, we will often continue the conservative management for even a longer period of time. In general, if I am going to take someone to surgery, though, I would prefer that they have symptoms six months or less since the risk of chronic pain tends to increase after a six-month window. So six weeks is sort of the

minimum, and hopefully six months in general tends to be the maximum in an ideal situation.

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ALAN P. LOZIER, MD: All right. Dr. Kahle, how soon after surgery should one expect to feel relief?

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W. KEITH KAHLE, MD: Well, hopefully because of the fact that we are actually doing this back operation for leg symptoms, hopefully immediately would be the ideal. And it's not that rare that a person with a large disc herniation might wake up in the recovery room or within a very short time notice great relief from the leg symptoms. Obviously, there is a certain amount of surgical soreness that's usually well-tolerated, but I guess to answer your question, leg symptoms hopefully very quickly if not immediately.

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ALAN P. LOZIER, MD: Thank you, Dr. Kahle. Now, both you and Dr. Carter have touched upon the difference between indications for leg pain and back pain, and in general, both of you seem to feel -- and I agree -- that we have better success with leg pain. Can you delve into that a little bit more for our audience? What is it about patients with leg pain that makes them better surgical candidates for a microdiscectomy than those with back pain alone? We'll maybe start with Dr. Carter.

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RICHARD L. CARTER, MD: The advantage of having leg pain is that it becomes very easy to localize where you think their pain is from. If you look at the spine, it's got a complex of joints and ligaments, muscles and discs, every one of which can cause pain, so when we see a patient, we want to know where is their pain coming from. The nerves are essentially hardwired into the legs, so when you have a lot of leg pain, the location in the leg in addition to any neurologic abnormalities such as numbness or weakness or reflex changes essentially gives you a clear-cut anatomic picture of where the pain is from. So patients who have leg pain predominant have success rates that are much higher than patients whose back pain is predominant. So clearly for a microdiscectomy, we want leg pain predominant symptoms. There certainly are other procedures, including fusions, that work for back pain predominant, but for this procedure, we do want a majority of the pain to be in the leg.

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ALAN P. LOZIER, MD: And Dr. Kahle, what's your take on the issue of leg pain versus back pain for our audience?

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W. KEITH KAHLE, MD: Well, I agree with what Dr. Carter said. An interesting, fairly common scenario is that a person with a herniated disc may initially have back pain, and they often will come in and say, "You know, over the next day or two after it began, the back pain actually went away and my leg started bothering me." And the back pain may well be just because the anatomy of the back is affected by the disc herniation, but there may be a delay in the development of leg pain because that pressure from that herniated disc may actually take a little time to set up the inflammatory response to the pressure of the disc fragment. And it's actually the inflammatory response that probably creates that leg pain. Another scenario is the patient that may have had chronic back pain for a long period of time and maybe that's due to degenerative disc disease. And then that degenerative disc then will herniated and become a ruptured disc, and they present now with additionally chronic low back pain, but now new leg pain. If you do a herniated disc operation, a microdiscectomy on that patient, it's much less likely that their back pain is going to

be substantially improved by that herniated disc operation. But the leg pain hopefully will be.

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ALAN P. LOZIER, MD: Well, thank you once again. It looks like we have some action in the O.R., so why don't we get Dr. Masciopinto for an update.

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JEFFERY E. MASCIOPIINTO, MD: Well, we have our x-ray results, and in fact our approach has brought us to the correct place. This is the x-ray here, and you can see that the -- this is the MRI scan. And on the MRI scan, to show you what the herniated disc looks like, this is a more normal spinal canal here, this triangular shaped area where the white is spinal fluid and the little dots are the nerve roots. Here at the injured levels, I think you can see on the left side, this is a normal nerve root surrounded by spinal fluid. Over on the right side, there's this darker gray material which, based on the MRI appearance, it looks to be a herniated disc. So that's really our surgical target today. And I'm going to move over to the microscope now and demonstrate the anatomy as we have it as we've approached the spine, and then I'm going to start the spine dissection in a moment. So currently you're looking through the microscope, and you can see the illumination is excellent. And even through our small incision, we have a fair amount of space to work. Where my instrument now is towards the head and now towards the feet. This is the middle of the spine, and this is the laminar bone off to the right side. And then this is the top of the sacrum. So most of our work is going to be performed in this very small area. So I'm going to work on the dissection here and back to you, panel.

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ALAN P. LOZIER, MD: Dr. Masciopinto, let me throw a question from our viewing audience to you. The audience member writes in, "I'm having an L5-S1 discectomy with fusion tomorrow morning. Why aren't you fusing this patient? Are there benefits to not fusing?"

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JEFFERY E. MASCIOPIINTO, MD: Well, there's appropriate operations for appropriate problems. And in this particular case, the patient's symptoms are almost exclusively leg pain from a herniated disc and an irritated S1 nerve root with very little mechanical type back pain, which is motion-induced back pain, which is a sometimes indication for fusion. More commonly, fusion is applied to patients who have instability in their spine, either from traumatic or degenerative problems. So there's a myriad of causes of spine problems, and surgery is focused on treating particular problems, and not one surgery fits all. So this is a more straightforward situation likely than the patient asking the question.

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ALAN P. LOZIER, MD: Thank you for that explanation. Why don't we continue on those lines with our panel and discuss indications for spinal fusion in general. Let's start with Dr. Kahle. What would be a typical indication for a spinal fusion?

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W. KEITH KAHLE, MD: I would agree with Dr. Masciopinto that the most common indication would be a spine that's unstable, a slippage, for example. We call it spondylolisthesis. But there is a mechanical lack of stability of the spine. If you're going to be in there working on the nerve, as with a microdiscectomy, and the spine is already unstable, perhaps that would be a time to also include a spinal fusion. A bit more controversial would be the indications for doing a spinal fusion in a person with chronic degenerative disc disease, sort of a worn out disc associated with back pain. We certainly do that selectively, but that's one of the more difficult ones for us to make the decision in the office as to whether that's the right operation for that patient.

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ALAN P. LOZIER, MD: Dr. Carter, can you offer us some perspective on that?

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RICHARD L. CARTER, MD: Yes, I think we have a different patient population often than the orthopedic surgeon so we do see other patients who do have problems that may be [amenable], and these include patients, for example, who may have tumors. Tumors that involved the bony structures, again, are just another reason for instability, so the main reason, again, is a stability issue. On occasion, we also, however, need to destabilize the spine in order to actually decompress the spine. Patients who have tumors that grow, for example, inside the spinal canal and outside, in order to completely eradicate that tumor, we often actually have to remove enough bone to cause a stability problem. In those patients, we then go ahead and secondarily reconstruct them. I would absolutely agree with Dr. Kahle that the degenerative disc disease patient is much more difficult. I think probably just a handful of times a year we would fuse those patients, or a number of times, but partly that is because, again, it's really difficult to determine if you're sure that's where the pain is from. So instability from many sources, including spondylolisthesis that Dr. Kahle had mentioned, tumor, and often sometimes the residual of infections can also leave the spine unstable. So those are other areas that may ultimately lead to a fusion procedure.

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ALAN P. LOZIER, MD: All right. Well, thank you. Let's go back to the OR now, as Dr. Masciopinto appears to be further along in the exposure and he can hopefully explain a little of what he's doing with that Kerrison rongeur there.

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JEFFERY E. MASCIOPIINTO, MD: Well, we've removed a little bit of bone, as you can see here, probably a millimeter or two on the top and outside edge of the space between the two bones. And then this yellow rubbery structure you see here is the ligamentum flavum, or yellow ligament, which is a spanning ligament. Not so much a structural ligament like knee ligaments or other joint ligaments. And we have our first access to the spinal canal, which you can see through that little opening there, and that's a little bit of fat, which is a normal finding in the epidural space. And my next maneuver is going to be removing this more lateral or outside bit of ligamentum flavum and then expose the nerve root.

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ALAN P. LOZIER, MD: All right, Dr. Masciopinto, it looks like we have another question for you from our audience. And this appears to be from someone you may have operated on in the past, and they'd like to know how much movement is actually being made with the instruments inside the body.

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JEFFERY E. MASCIOPIINTO, MD: Well, mostly we're working through a very tight tunnel, so it's a fair amount of vertical movement but very little left to right movement. This instrument that I'm using has a face that's about 2 millimeters, so very small instruments, very focused, and of course, always very careful not to intrude upon the neural canal where the nerve roots are. So only movement that's needed is one rule in surgery, and just being careful.

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ALAN P. LOZIER, MD: All right, very good. And we have another question from our audience. This question we'll give to Dr. Carter. And the audience member would like to know how many disc surgeries can be done, how many levels can be operated on. This patient states they have five ruptured discs.

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RICHARD L. CARTER, MD: In general, I would say over 90 percent of the time. We try to figure out clinically where their pain is from, and so in most circumstances we will just take one disc herniation out. I think the second point to be made is if you look at an MRI report or read it, it'll often say a herniated disc at almost every level. Most of those times, they're really not true herniations, but they could be simple what we call bulges or degenerative changes where the disc space shrinks a little bit and the ligaments fold back. So clinically you try to, again, try to find out where the pain is from using the leg anatomy to often determine that course. So I don't believe I've ever operated on five levels. I think the most I've ever operated on is two levels, and often that's in a case where you can have such a large extrusion that sometimes it can be difficult to tell which space it came from. But it would be very rare that you would operate on more than two levels.

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ALAN P. LOZIER, MD You know, the terms are sometimes interchanged and can often be confusing, and it might be useful just to go over them and draw some analogies. Common terms that I hear put out there are bulging discs, ruptured discs, herniated discs, and slipped discs. And I tend to think of the disc, as I said previously, as a pillow. In a bulging disc, that pillowcase might be stretched, but it's not torn. I tend to think of a ruptured disc or a herniated disc as the same entity where there's an actual physical tear in that casing and some of the stuffing has extruded. Dr. Kahle, you mentioned a slipped disc previously. What is a slipped disc relative to spondylolisthesis, a more complex medical term?

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W. KEITH KAHLE, MD: Well, people mean different things by all these terms. I have patients come in to see me who have seen a number of different providers along the way, maybe a physical therapist, maybe a chiropractor, all legitimate care providers. And yet we're not at all consistent on the terminology we use. When I'm reviewing an MRI scan with a patient, I point out that I'm looking at these pictures through the eyes of a surgeon, so if I use the term herniated disc or ruptured disc, I'm thinking of one that's large enough that it's actually putting pressure on a nerve in a way that I think surgery may be a reasonable alternative if they're not getting better. On the other hand, degenerative disc disease, which is just a normal wearing out of a disc as you get older, is almost like taking a tire and removing some of the air. And they always bulge. Anytime you see a degenerative disc or an MRI scan, there'll be a little bulge around the edge. May not mean a thing in terms of surgical significance. So the real trick for us as surgeons isn't necessarily what we do in the operating room as much as it is deciding in the office as we're sitting there talking to the patient and looking at these pictures, boy, is this the pain producer, is this big enough to really be a reasonable option to go after surgically.

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ALAN P. LOZIER, MD: And I think for our audience members, that's a critical factor when you decide who's going to do your surgery. It's not only the technical expertise but it's the judgment in determining whether surgery is really appropriate for your situation, and that speaks to our first audience member's question, I think, relatively directly. Back to the issue of a slipped disc --

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W. KEITH KAHLE, MD: Let me just follow up on that for a second, Alan. Frequently, patients will be given a copy of their MRI report. And radiologists are trying to be very detailed and very specific in their descriptions, and yet a patient may actually have in writing, "I have a herniated disc," as defined by a radiologist, and technically they may be correct. One person's description of a herniated disc may be another person's bulging disc. We're not terribly consistent, as I said. But I would just

encourage people not to get too focused on that report that they've been told about it. It may or may not have any significant surgically or even regarding their pain.

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ALAN P. LOZIER, MD: Yeah, I think it's a really critical factor in determining the success of your operation. Many operations can be performed, but only the appropriately selected ones are likely to lead to a good result. So back to this issue of slipped discs, Dr. Carter, and what -- when you think of a slipped disc, and a spondylolisthesis is something that might lead one to have a fusion. What does that actually mean when there's been a slippage?

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RICHARD L. CARTER, MD: I think the vernacular term of slipped disc, however, still applies to most people who hurt their back. And they probably don't have a true spondylolisthesis. If I can have the model there, Keith. We can't really show you what that slippage is, but in general, if the bone here were to move forward with respect to the bone below, that is called a spondylolisthesis. And that's a different entity than I think most people in the past have called a slipped disc. I think those patients still are referring to either herniated discs or even just simple back pain. The significance is that a slipped disc -- or a spondylolisthetic disc is going to be treated differently than a herniated disc. And I think the key, and I think we've all hit on this today, the selection process is not only to the right patient but the right procedure. And a lot of that goes into experience, and this has sort of been an ever-refined process during your practice that you've learned by just repetition the number of patients you see that there are certain categories that we do well with this procedure and there are others who would do better with another procedure. So all those things go into play in designing the right patient that you see and at the same time designing the right operation for that patient.

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ALAN P. LOZIER, MD: Well, thank you. And you can see, the terminology here can be quite confusing. And what I might be referring to as a spondylolisthesis might be a simple disc herniation or a disc bulge in someone else's terminology. Well, let's go back to the OR and get an update from Dr. Masciopinto as to where we are in the operation.

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JEFFERY E. MASCIOPIINTO, MD: Well, we've removed the ligament around the nerve root and we have now exposed the nerve root. Again, there's this yellow material you see here is normal fat that lives in the epidural space, which is the area around the nerves. And then this is the S1 nerve root. And below it we can see the disc space, which is the more glistening white area here. And in a moment, we're going to place a retractor in that space and then open up the disc. Retractor? How about the smaller one?

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ALAN P. LOZIER, MD: And Dr. Masciopinto, what's the purpose of the retractor on the nerve there?

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JEFFERY E. MASCIOPIINTO, MD: Our retractor is designed to hold the nerve root away from where we're working and to in fact protect it from us working around it and mainly to allow for an effect exposure of the area that we're working. I'm now using a scalpel to open the -- and micro hook. And that instrument is then into the disc space.

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ALAN P. LOZIER, MD: And do you think you could possibly give us a more zoomed in view of the disc that you're working on there?

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JEFFERY E. MASCIOPIANTO, MD: Does that help at all?

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ALAN P. LOZIER, MD: Yeah, that's actually very helpful. Thank you.

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JEFFERY E. MASCIOPIANTO, MD: So now we can see the opening in the disc space. And I'm going to place an instrument through that opening just to confirm we're in the right spot. And I've sort of popped into the disc there, and now I'm going to explore for the disc fragment. Regular nerve hook? Which may take a little time.

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W. KEITH KAHLE, MD: As we're looking at this, this is obviously a portion of this material that's outside of its normal location, it's into the nerve space, and yet there's still quite a bit of disc material that's still in its proper location deeper. When you do a microdiscectomy, do you have a goal on how much disc material to remove?

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ALAN P. LOZIER, MD: Well, typically the portion of the disc that has escaped the casing and is pressing on the nerve is really the target of the operation. As you can see where Dr. Masciopinto is currently working, there is a small hole in the disc. And Lee Russey, Dr. Masciopinto's assistant, has the nerve held back from that location. Let's just go to the camera here for a second, because he does appear to have a piece of the disc in the pituitary. Dr. Masciopinto, can you comment on what you've got there.

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JEFFERY E. MASCIOPIANTO, MD: It looks to be the first real fragment that we've obtained. I'm going to explore a little more, and we'd expect to see some more than that. It might take a few moments to complete the deep dissection here, but things are going just fine.

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ALAN P. LOZIER, MD: So typically, I try and remove the portion of the disc that has escaped the casing and then just a little bit underneath the hole to try and prevent that material from being extruded immediately following the surgery. That hole still has to heal up after the surgery and is a source of a potential recurrent disc herniation.

00:37:16

RICHARD L. CARTER, MD: There's a lot of studies about that, and initially we were taught many years ago to go ahead and remove a lot of the disc material to prevent recurrences. And so the initial thought process is the more disc removed, the less risk of recurrence. And recent literature would suggest that that's actually not correct, that if you just remove the fragment that you really don't need to violate and rupture the disc space proper, which has some implications. Most of the patients now, if we do what we call actually a fragmentectomy and very minimal invasion of the disc probably have a less risk of back pain and the recurrence rate does not seem to be affected in either way. So I predominantly move fragments and leave almost all the disc.

00:37:57

ALAN P. LOZIER, MD: And I would agree with that perspective as well that the goal of the operation is to remove the part that is pressing on the nerve and leave as much of the normal disc behind to perform its shock-absorbing function.

00:38:12

W. KEITH KAHLE, MD: It's sort of similar in the world of orthopedics to people who get a torn cartilage or torn meniscus in their knee. I know 30 years ago when I was an orthopedic resident, the wisdom at that time was, if you have a torn cartilage or meniscus in your knee, was to remove as much of the cartilage, or all of it, if

possible, and now it's just the opposite. People tend to just trim up the edge. And I think the same philosophy applies to disc removal as well. Leave as much cushion as you can, whether it's in the knee or it's in the disc.

00:38:51

RICHARD L. CARTER, MD: I'm glad you're dating yourself here.

00:38:53

W. KEITH KAHLE, MD: It's really sad, really sad.

00:38:55

RICHARD L. CARTER, MD: But actually, it's true. I actually had a disc surgery when I was 19, and they removed an aggressive amount of material, and then a recurrence did occur about 18 years later. And of course, the amount that was removed was so significantly different. So it makes a huge, I think, prognostic implication for recovery to minimize what we do.

00:39:15

ALAN P. LOZIER, MD: And I think to follow-up on one of our audience questions, that can be one of the indications for a future spinal fusion. If you have a very aggressive discectomy done, that disc is likely going to collapse over time and may lead to some back pain and may ultimately lead to an indication for a spinal fusion.

00:39:35

W. KEITH KAHLE, MD: In your experience, Alan, what is the percentage of people who have a microdiscectomy that are going to get a second one, second herniated disc, in the same location?

00:39:46

ALAN P. LOZIER, MD: Well, I think it's fairly low, under 5 percent. But certainly we do see it, and I tend to see it often in young patients who have soft discs, people in their 20s in particular. And for that reason, I really try and manage patients with disc herniations in their 20s conservatively if at all possible.

00:40:10

RICHARD L. CARTER, MD: Yeah, I think that's about right. I think the last data we looked at was 3 percent in the first three year. But if you look at lifetime risk, it's probably a lot higher. You may do well for 20 years, but you can still have a recurrence down the road. So lifetime risk is predicated on the age, I think, of the first herniation. So it's 3 percent first three years but up to 15 percent or so, depending on how old you are the first time you have the surgery.

00:40:37

ALAN P. LOZIER, MD: Let's get an update from Dr. Masciopinto as to what's going on in the surgery.

00:40:42

JEFFERY E. MASCIOPIINTO, MD: Well, I've just cleaned up the disc. Again, not doing an aggressive discectomy but just having a look at it. And found a number of fragments, and then I'm just exposing the nerve root a little more inferiorly, or downwards, because that was where the fragment tended to migrate. So I'm just going to have a little better look at that. I'm just trying to retract on some of the epidural fat that's here and don't want to leave behind a piece of fragment. So we're just being careful. But the nerve feels quite free at this point. As you can see, it's quite mobile. And I'm not sure we're going to find much else, but I want to make sure we don't miss something there.

00:41:24

ALAN P. LOZIER, MD: Okay. Very good. We have a few more questions from our audience. We'll pitch this one to Dr. Kahle. "I had a laminectomy in the early 1980s for a herniated disc with a painful left leg. Is a microdiscectomy a specialized term updating the wonderful way you are now able to fix a herniated disc, or is it different from a laminectomy?"

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W. KEITH KAHLE, MD: Well, technically, the term laminectomy would mean removal of the lamina, and the lamina is just this bony roof that covers up the nerve space. What Dr. Masciopinto is doing and what a microdiscectomy does is actually technically a hemilaminotomy. It means just one half of the lamina has a little window made in it instead of removing the entire lamina. So if in fact you had a true laminectomy, sometimes we actually use the term -- again, inconsistently and maybe even inaccurately, we may say, "Well, this person had a laminectomy," when in fact they really had a laminotomy, just a little window made in it. If you had a complete laminectomy, that may be what was necessary, but for the standard straightforward herniated disc these days, a smaller window, I guess, would be the change that has made this better.

00:42:41

RICHARD L. CARTER, MD: Yeah, I think historically laminectomies were for disc surgery back in the '80s, so it wouldn't surprise me with a more aggressive bone removal was done. I think it really was the advent of the operating microscope that occurred, oh, probably mid to late '80s was when this transition occurred.

00:43:00

ALAN P. LOZIER, MD: And you can see with the incision that Dr. Masciopinto has made, which is probably an inch at most, that we've got a very small exposure here. And it would be very difficult to do a full laminectomy, in fact, through that incision. So I think, you know, we are making an emphasis on making smaller incisions and smaller disruption of the integrity of the spine to get down to where we need to work. And the laminotomy rather than a laminectomy is to that point as well.

00:43:32

W. KEITH KAHLE, MD: Yet having said that, our intent is to go in and be minimally invasive and do the small incision and do what needs to be done, but the incision is really not what the operation is about. And if during the operation you run into unforeseen circumstances that you just can't do the work that you need to do and you need to make a bigger incision, that's still the right answer. It's still not going to be perhaps the length of some of the incisions we made years ago, but we don't want to get too hung up on the small skin incision if it takes a little bigger one to do the job that you came here to do.

00:44:03

ALAN P. LOZIER, MD: This is true. We want to do the smallest effective operation. A small operation that's ineffective is not very helpful. All right, we have another question from our audience. "Are there any physical exercises that can strengthen the muscles, the skeleton or the tissue around the discs in a way that everyday things we do can keep up in a more preventative mode?" Dr. Carter?

00:44:30

RICHARD L. CARTER, MD: I tend to focus a lot on stretching exercises. There's not a lot of specific data but at least stretching has shown to at least have a better preventative component to back pain. And I tend to aggressively have my patients after surgery starting around two weeks begin the stretching. And I think the other probably most important thing is to strengthen the abdominal muscles. Unfortunately, as we age, we tend to have to actually stretch those muscles. But if one were to go ahead and strengthen the abdominal muscle, that does take a lot of stress off the back. And I kind of picture the spine, if you will, as sort of like a tower, and it has three guide wires. And the abdominal muscles is one of the guide wires and the paraspinal muscles that run the length of the back are the other two. And I think it's important to have a balance of all three. Back muscles in general are very strong, but unfortunately, abdominal muscles tend to be stretched for a lot of reasons. And so I tend to focus on the abdomen and also just flexibility.

00:45:29

W. KEITH KAHLE, MD: And that certainly is key. We always start with a lifestyle of fitness, an exercise routine, strengthen the muscles in front, strengthen the muscles in back, as Lee was saying. But probably equally important, if you're saying, "What can I do to minimize the strain on my disc?" Exercises really don't strengthen the disc so much, but you need to learn the mechanics of how to lift, how to bend safely. A lot of times the physical therapist or a chiropractor may have a set of exercises that they can show you and actually demonstrate to you better lifting and techniques for doing some of the things that would actually load the disc dangerously that are somewhat separate from the muscle strengthening part of this.

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RICHARD L. CARTER, MD: And I think another really important issue preventative-wise is weight.

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ALAN P. LOZIER, MD: I was going to bring that up as well. Weight loss, I think, is a critical factor for decreasing the occurrence of back pain. I also think that some of the more modern trends for yoga and pilates and other things of that nature that speak to strengthening core muscles such as the abdominal muscles are a really good way to decrease your back pain. All right, well, let's go back to the OR and find out how we're doing with our discectomy.

00:46:52

JEFFERY E. MASCIOPIANTO, MD: Well, we've removed some of the disc that was under the nerve below the disc space here. You can almost -- you can see there's some remnant of what we call a pseudocapsule, which is the body's walling off disc fragments here. And the nerve, again, we have a nice look at the nerve there, and it's quite mobile. Seems free of any significant compression at this point. So we're really just about done in the operating room. We'll make sure there's no bleeding. As you can see, there's not much to begin with. And then we'll close. So from the surgeon's perspective, I think we're in good shape.

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ALAN P. LOZIER, MD: All right. And Dr. Masciopinto, can you give us an estimate as to how much of the disc you actually took out?

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JEFFERY E. MASCIOPIANTO, MD: I would say less than 10 percent.

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ALAN P. LOZIER, MD: And that's obviously a goal of the operation, to only take out what's absolutely necessary, is that correct?

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JEFFERY E. MASCIOPIANTO, MD: Yeah. Mainly, again, what you want to do is make sure that there's no impingement on the nerve when we're done. And again, very objectively I can see a nice mobile nerve here. And removing the disc from within the disc space, unless there's a piece that's quite large and free, probably doesn't have much merit. So there is a bit of a mechanical inspection of the disc space, but typically don't endeavor to scrape or remove the majority of the disc.

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ALAN P. LOZIER, MD: We have a couple of other questions for you, specifically with regard to scraping. One of our viewers want to know what you do if the disc material is actually physically stuck to the nerve.

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JEFFERY E. MASCIOPIANTO, MD: Well, that happens. And when it does, the microscope is quite handy for that. It gives you a nice illumination and lets you work with a little more security. But in general what you have to do then is just very carefully remove the scrape. In scraping, you use fine instruments, very micro type

instruments, to try and find the intersection of the disc with the dura, which is the normal covering of the nerve, which has the consistency of cellophane. So it's quite thin itself. But you just have to take your time and work it out.

00:49:20

ALAN P. LOZIER, MD: Another viewer would like to know if you could do this operation with [loops] and what you perceive the advantage of the operation microscope to be.

00:49:31

JEFFERY E. MASCIOPIANTO, MD: You certainly can do the operation with [loops]. I've done it many times. I think when you're experienced you can do a very similar operation. For me I like the illumination. I also like the fact that I'm not stooped over for the majority of my operating days and I can stand nice and tall. And it also allows for an assistant to help through a very small incision. So those advantages, as well as the increased magnification, allow the microscope -- I think most of us like to use it, but it's really a surgeon's preference.

00:50:07

ALAN P. LOZIER, MD: Yeah, I would agree with all of those points. And another viewer would like to know, "How many different tools have you used during this surgery, and which one is used most frequently?"

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JEFFERY E. MASCIOPIANTO, MD: Well, we use the scalpel and then electrocautery, which is an electric dissecting knife and also helps with any bleeding vessels. And then we've used what's called a curette, which is almost a miniaturized ice cream scooper, which is a nice tool to dissect the bone from the ligament. And then we've used an instrument called a Frier, which we used to mobilize the nerve. It has a nice thin and flat plate to it. And then we used some instruments to bite off bone. These are called Kerrison punches or Kerrison rongeurs that have sharp tips and a biting jaw to remove bone. And we also used the drill. And then we use an instrument called a pituitary, which is an alligator-like pinching instrument.

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ALAN P. LOZIER, MD: Can you show us the drill? I don't think our audience got a real opportunity to see too much of that.

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JEFFERY E. MASCIOPIANTO, MD: This is the drill, and it has a fine tip on it like a Dremel. And I believe this particular drill rotates at about 70,000 rpm. And it's a way to dissect bone. You create almost a paintbrush-like way to remove bone in very small increments at a time. So we use this type of drill for very tight places, both in cranial and spinal surgery.

00:51:43

ALAN P. LOZIER, MD: All right. Very good. Well, we'll let you get on to closing and maybe come back to you one more time for a view of the closing procedure. We've got another question from the audience, and I'll throw this out to both of you. "What are some causes of a disc herniation? What age groups are most affected? Does ethnicity or race have an effect on the incidence?" And we'll start with that. Dr. Kahle or Dr. Carter?

00:52:15

W. KEITH KAHLE, MD: Well, causes that may -- there may just be a major trauma event, just a real unusual degree of lifting in a bad mechanical position may take a perfectly healthy disc and cause that central portion to just poke through and create a herniated disc. There may be preexisting wear and tear in the disc. They may have weakened it somewhat. So perhaps a middle-aged person that's gone through some of those degenerative changes might be more prone to have that sort of a situation, whereas a younger -- we even see herniated discs in teenagers from time to time or

young adult. That may be more of a health disc before the significant trauma event. Lee, what do you think?

00:53:04

RICHARD L. CARTER, MD: I think you have sort of two age populations. The younger patients, you're right, you can get it as a teenager, but 18 is on the younger end. But typically 30s, 40s, 50s, you have the people who have more softer herniations. Then you have a second group of people, beginning in their 60s, 70s, 80s, where you have the very same symptoms, but it's not from a disc herniation, it's actually related to bone overgrowth. Another term you might hear is lateral recess stenosis. So one is a bony impingement and the other one is actually a true disc herniation. In terms of causality, you're right, trauma is one. I always try to tell patients, though, sometimes -- or actually, 50 percent of the time we don't know what caused it, it just occurred. Simple trauma such as a sneeze can actually cause a herniation. So the reasons why are very varied. But again, half the time we don't know. There's no specific event.

00:54:00

ALAN P. LOZIER, MD: You know, sometimes patients ask me, do discs wear out? What do you guys think?

00:54:07

RICHARD L. CARTER, MD: Well, we wear out, so I guess they do.

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W. KEITH KAHLE, MD: Our whole body wears out.

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RICHARD L. CARTER, MD: Yes, they do.

00:54:11

ALAN P. LOZIER, MD: Yeah, I think they do. And sometimes that alone, just the aging process can be the cause for some neural impingement.

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W. KEITH KAHLE, MD: On the other hand, you may see, say, an x-ray or an MRI scan of an older patient who has worn out, like we all do, who has no symptoms whatsoever and yet a terrible looking MRI or x-ray. And if you went into the room and you knew nothing about the patient and you just looked at those imaging studies, you might say, "Wow, I bet this patient's really having a lot of pain." They might not have a lick of pain. So we've got to be very careful not to overread all these pictures that we have all this detail on. It may not correlate at all to how the patient feels.

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ALAN P. LOZIER, MD: And I think that speaks to our viewer who had the five ruptured or herniated discs. Well, that may be what the MRI demonstrates, but that doesn't mean that those disc herniations are symptomatic. They may not need to be treated.

00:55:04

RICHARD L. CARTER, MD: Yeah, I have an expression that I tell my patients: I don't operate on the MRI, I operate on you. And you're right, there are many patients in their 80s. Just the natural aging process causes the discs to essentially desiccate and fuse.. So many patients can have chronic pain for years and years and all of a sudden they get into their 80s and a lot of times it actually improves.

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ALAN P. LOZIER, MD: All right. How are we doing, Dr. Masciopinto?

00:55:27

JEFFERY E. MASCIOPINTO, MD: I'm just having a final look around and we should be done here in a minute.

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ALAN P. LOZIER, MD: All right. Now, here's a question for you in the OR, Dr. Masciopinto. What do you use to cover the nerve or disc space prior to closing, if anything?

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JEFFERY E. MASCIOPIINTO, MD: We've made an opening that's approximately this big, so about three-quarters of a centimeter. And I typically cover it with a woven product that's called Surgicel, which is a hemostatic agent. It also retards infection. And some think, and I tend to think it's true, it provides a little barrier to scar formation. In the past, people have placed fat grafts, so fat harvested from within the incision, over the nerve root as a barrier to scar formation. And some people do nothing. So there's no right or wrong, and even with attempted looks at ways to prevent scarring, it's never been demonstrated that there's one product or technique that's better than another. I really think the key to prevent scar is to minimize the amount of cautery you use and to keep the incisions small and to try and do as little damage to the normal anatomy as possible to get the job done.

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ALAN P. LOZIER, MD: Thank you.

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RICHARD L. CARTER, MD: Yeah. I'd like to also add to that is one of the things I think is probably most important in terms of scar prevention is stopping the bleeding. And the Surgicel that Dr. Masciopinto refers to helps in that process. And I think meticulous ability to control all bleeding is probably the most important thing to prevent scar.

00:57:07

W. KEITH KAHLE, MD: I agree.

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ALAN P. LOZIER, MD: All right. Do you guys have any other points you'd like to bring up as we are approaching the end of the webcast today? I think we've had a really lively discussion about some of the topics. Are there other issues that you'd like to touch upon? And one I can think of, and I think you have a good perspective on this, Dr. Carter, is how big a problem is back pain in general in society, and what is its cost to society?

00:57:39

RICHARD L. CARTER, MD: Well, it's the number one reason why people actually go see a physician in the United States. It's the number one chief complaint. A study about five, six years ago, I think they totaled the cost of physicians' fees, medical imaging, surgery, in addition to lost wages, and it was a multibillion-dollar problem.

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ALAN P. LOZIER, MD: I believe \$50 billion is the number I'm familiar with, half of which is due to lost wages.

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RICHARD L. CARTER, MD: Most actually a little bit more than that. So we need to really in this country focus on prevention, and I think that's the biggest key that if there's a take-home message, certainly this is a great operation, but certainly reserved for just a few percentage of patients. And hence, if we can prevent this, a lot of these problems can actually not require surgery in the long-term.

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W. KEITH KAHLE, MD: Absolutely. We're talking about the end result of a long process of trying a number of things before you ever get in the operating room. And for most people, surgery is a last resort rather than a first resort, as it should be.

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ALAN P. LOZIER, MD: Well, I think we've had an opportunity to show you one of the smaller, more minimally invasive operations that we do here at Dean and St. Mary's.

This is just one of the many treatments that we have for spinal disease and disc disease. But it's really one of the most gratifying because many of these patients will go home either the same day or the following day and be rid of leg pain that was fundamentally altering their lives. And as I think about indications for spinal surgery, the impact that your pain is having on you is really the critical factor. It's altering your quality of life, and that's often going to be a prime indication for surgery. Do you guys have any feelings about indications beyond what we've already talked about?

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RICHARD L. CARTER, MD: I think you're right, Alan. It's really important to individualize your treatment. There are patients who have massive disc herniations who have no pain and no deficits. And despite an MRI that looks absolutely horrendous, I'll often just treat them conservatively. And we have patients that have very small herniations that are exquisitely tender and sensitive and are miserable. So it really, truly is an individualized treatment based on the patient, not just an MRI feature, and of course, the failure of really trying to eradicate their pain with conservative management.

01:00:17

W. KEITH KAHLE, MD: Well, some cases are pretty straightforward, but many are not, and that's where I find it to be very, very helpful to have guys like Alan and Lee around to -- most of the gray hair that I've gotten is deciding who to operate on and where to do the surgery rather than the operation itself. And so it really is helpful to have some colleagues that you can just bounce off ideas with me, just review imaging studies together, we may actually see patients for each other, just for another opinion. And that's so helpful to make that decision. If you're not sure, take your time. Even as a surgeon, you can get another opinion before pressing on.

01:00:58

RICHARD L. CARTER, MD: Yeah, I think that's a big advantage that we have here because we do have an excellent collegial working relationship between orthopedics and neurosurgery. And Keith is absolutely right. Sometimes a different perspective can change your entire thought process on the patient, and we do it amongst ourselves not only within neurosurgery, but again, with orthopedic surgery, and I think that's very crucial.

01:01:19

ALAN P. LOZIER, MD: Well, I think that is one of the missions of the spine center that's building here at Dean and St. Mary's, in conjunction with the near state-of-the-art facilities that you've seen here today. We're really able to offer an integrated approach with both orthopedic and neurosurgical perspective and using the most modern and up-to-date technology available. Well, let's get some final thoughts from Dr. Masciopinto as we're coming to the end of our webcast.

01:01:49

JEFFERY E. MASCIOPIINTO, MD: Well, we're just going to irrigate here, and then we'll close. And the closure will consist of all dissolvable stitches. And this patient will hopefully be up in his room within about an hour and a half and on his way home tomorrow. And we usually follow patients after this operation at two weeks and then again at six weeks and at three months, just to make sure their recovery is coming along well. And I would just like to again thank the patient for being willing and in fact very interested in helping us today. Thank you, everybody.

01:02:27

ALAN P. LOZIER, MD: Well, thank you, Dr. Masciopinto. And I'd like to express my gratitude for all of you who tuned in today. And thank you very much for joining us here. On behalf of the panel, Dr. Carter, Dr. Kahle, and Dr. Trier, you've been

watching a webcast of spinal microdiscectomy surgery at St. Mary's Hospital in Madison, Wisconsin.

01:03:04

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