ALEXANDER K. POWERS: So a few definitions-- scoliosis is a coronal plane abnormality. So you're looking at the patient straight on, shoulders, hips towards you, they've got a crooked spine. I'm going to see if I can work this pointer. Well these are our clinical pictures of scoliosis. Kyphosis is a sagittal plane abnormality, OK, where the bent back is forward.

So there's three curves in the spine. You've got the cervical lordosis, the thoracic kyphosis, and the lumbar lordosis. When you've got hyperkyphosis, this is, as we see, a progression here. Normal is on the left and one is on the right. Let's see if there's a-- yeah, good. Again, clinical pictures here, spinal balances in the frontal plane, or AP diameter, the sagittal plane, or that lateral view, and then there's combined. And people can have pain if the balance is off.

And so we discuss things in terms of coronal balance. This patient is balanced. So there's a curve here and a curve here, but as long as the neck and head are over the pelvis, along this mid-line, it's balanced. And as we start to get off that line, that's when patients will start to have pain. Because as gravity pushes down on the spine, muscles are going to try to get to head back over the pelvis.

The same can be true in the sagittal plane. So as long as the base of the neck, which is the C7 vertebral body, sits over the back part of the sacrum here. We say that that patient's in normal sagittal balance. When that line starts to move forward, that's when a patient has positive sagittal balance. You'll see a positive kyphosis. And they'll frequently report back pain because they're trying to go against the weight of gravity.

Here's some more clinical pics. This thing does not work great. OK, so evaluation of the patient with scoliosis, and we're talking about adult scoliosis. But, again, it can happen at birth all the way up through adulthood. These are kind of the first things that I think about, but we have to first start off with these things.

Does a patient come in with back pain, leg pain, both? Easily fatigued? Because of that, if they're out of balance. Decreased activity level to the point that they used to walk around the track, now they can't get up and go out to the mailbox, to the point where they have a change of mobilization.

So they've been getting around, and now they are using a little hover around or a walker or cane or not even getting out of the house. I'm losing slides here. But, OK, so things ain't what they used to be and never were. So before patients as we got older and as our spines began to change as a result of years of gravity, we said, you know what, you're too old to be treated.

And we're going to talk about a few patients here that in the past we would not have treated. We would have just told them, yeah, go ahead and get in a wheelchair. Go ahead and get in a hover around, mobilize as well as you can. And they're actually now starting to become operative candidates.

So the types of adult scoliosis, idiopathic scoliosis is the type in patients that have scoliosis as children, and then as they mature into adulthood, they didn't have their scoliosis treated. And they continue to have it. You guys have-- there may be some people in here that we're told as kids they had scoliosis. And they still have it. It's not something that's going to get better. In certain patients, it will get worse.

So we think a curve that's greater than 50 degrees-- you guys might have heard that, those of you that did have scoliosis and you saw somebody-- a curve that's 50 degrees or less is probably not going to progress once your skeletal mature. And that's two years after puberty. The curve that's greater than 50 degrees, we usually think of it progressing one degree per year. And so that's why we recommend treating that in the teenager.

But even into adulthood, you have an adult that's 50 years old, and they have a 70 degree curve. 70 degree curve is something that you're likely going to see. You're going to have some-- usually it's some shoulder asymmetry, maybe some pelvic asymmetry. But if they're 50, when they're 70, and they're still wanting to be active, that curve is now going to be 90 degrees. And it's going to be pretty limiting. So that's a reason that we think, OK, we may want to think about treating it as a 50-year-old rather than waiting until you're 70.

Degenerative scoliosis is the type that we're going to mainly discuss here today. Which is as we just get older, the normal degenerative arthritis process, herniated disks, bone spurs, facet problems in the back, the weight of gravity on our shoulders. We start to get out of alignment, and then the weight of gravity continues to push us in that direction that we're starting to fall off.

Neuromuscular scoliosis in adults is kind of a new concept. In kids, we think of kids with cerebral palsy, Duchenne Muscular Dystrophy, those kinds of things, for those of you that take care of children. In adults, we think of things like Camptocormia, movement disorders, spinal deformity secondary Parkinson's disease, those types of things. And just a quick, this is a patient, interesting story. So he was treated years ago. He had a L2 fracture dislocation after motor vehicle accident.

This is before the era of expandable cages and pedicle screws and that kind of thing that we have now. So the surgeon that was here who's since left put this in there. Does anybody know what that is?

AUDIENCE: Methylmethacrylate?

ALEXANDER K. POWERS: What's that?

AUDIENCE: Methylmethacrylate.

ALEXANDER K. POWERS: Methylmethacrylate, yeah, so that's just a ball of cement that he used to create the vertebral body here that originally was broken and then became infected. And then because of the infection, it just eroded. So I thought that was a pretty good way to treat it. However, two Thanksgiving's ago, he reached across the table to get yams, no lie, and he felt a pop. And this thing started to work its way-- he broke his fusion-- and this thing started work its way out like a big zit.

And so we went in and took that out. And by the time he saw me, he was told by several surgeons, look, you're going to die. You know, I don't-- we don't have a whole lot of hope for you. But we took this out, washed it up, put a G tube in him, and a year later came back and reconstructed his spine. But you can see that-- and this is the reconstruction afterwards, but-- so our current approach is always do a thorough history and physical. This is not a typo. Treat the patient. Treat the patient. Treat the patient. Don't treat the x-rays.

For those of you that see patients in general practice, friends, whatever, I get a lot of patients that come, and say, I've got scoliosis. I need to be treated. That's not necessarily the case. And we'll go through a few of those. Sometimes you do need to fix the curve. But it's a lot different to fix the spinal deformity as opposed to fixing the leg pain. And we'll try to discern how to do that. You're talking about in one operation changing the oil in the car, in the other operation, completely rebuilding the engine.

Non operative care for these patients, which we want to exhaust completely, and then when they say they want surgery, you want to exhaust them again. And when they come back, and say, please operate on me, again. You say, are you sure? Because you could die from this. And then when they are begging you for that. That's when you say, OK, maybe we'll talk about it, and send back home again. This is not an operation that you want to take lightly nor an operation that you want to recommend anybody, OK?

I don't recommend this to anybody, even though I do a lot of it. I tell people, look, I want to talk you out of it. And I want you to ask me for it, maybe even beg me for it. Because it's a big deal, lots of blood loss, lots of time in the hospital, lots of time recuperating. But three months later, these are, hands down, the happiest people in my practice.

So non-steroidals, physical therapy, daily exercise, patients with adult degenerative scoliosis, adult idiopathic scoliosis, all get better if they swim. Getting in the pool takes the weight of gravity off their spine, takes that-- their whole problem is they've lost the mechanical advantage of their spine when they're standing upright. So their crooked. Gravity pushes them off the side, their muscles are trying to get them back. When they get in the pool, the weight of gravity is off their shoulders.

Bracing is only for comfort. This is different than the bracing for pediatric scoliosis where we're trying to correct the curve. The bracing that we use here, mainly soft braces, things to make their spine feel better, we're not trying to correct an adult curve with a brace. That's not what we're trying to do, And then medical management of osteoporosis is something we should all do and all think about this patient population.

OK, so, quickly, our current surgical approach, we want to go, or I do, all posterior and posterior-lateral surgeries. I don't do any anterior surgery for deformity. I used pedicle screws for my fixation of the spine to correct deformity. We'll talk a little bit about osteotomies, which is where I cut part of the spine out to begin my correction. We'll talk about some of the appropriate corrective techniques, and in really taking advantage of the segmental pedicle screw purchase of the vertebral bodies is the mainstay of how we correct the spine. We put screws into the spine and then connect the screws with rods.

Pedicle screws are placed in a free hand manner. And I say that, but we-- I want to show you a picture here. This is O-arm behind my assistant here. And this is a spine that's turned over 90 degrees. So that the probe typically is pointing down towards the ground because the patient is prone. But this spine is turned and rotated on itself. And when they do that, I usually use guidance because I'd rather not put the pedicle screw into here.

So when we put pedicle screws, we start in the back here, and they go into the vertebral body, and they use this little bridge of bone called the pedicle. On the left side there's this big red thing called the aorta. And immediately there's a spinal cord. So that's a pretty narrow window to which we put the screws.

This is just a little schematic. So expose the spine and completely, make a little hole where the pedicle screw is going to insert into the spine, and then we put this gear shift down into the bone, take it out, and then I'll prob, feel it, tap it, and then put a screw in. Once all the screws are placed, sometimes we use EMG, so I'll stimulate the screws just to make sure that one of these screws is not up against a nerve root or the spinal cord. I do that sometimes. All the time, I'll check with x-ray, usually fluoroscopy to make sure of the trajectory.

This is a paper written back in 2004. There are over 10,000 screws placed in this free-hand technique. And it's the technique that I learned here from my mentors. It's the technique that I teach the residents. And it's safe and effective and quick.

The type of osteotomies we use, It's really not germane to you knowing the names of them. But we're going to go through kind of how they're done and why they're done. The first one's a Smith-Petersen Osteotomy, which is where I just re-sect the lamina and the facet joints, usually gives me about 5 to 15 degrees of correction. This is the most simple of the osteotomies. It's by far the most common one that I use. Because it's-- the bone is already there. It's exposed. And we just take it out. And it really does free up the vertebral body to move.

Here's a patient with a pretty significant coronal plain abnormalities you can see. She's fallen off. I've got some clinical pictures here. This is her in the sagittal planes, so she's pitched to the side and forward. This her here. What we know that with these bending films, we know that her spine is pretty limber. So we're not going to have to do a big-- we're not going to have to take out a vertebral body, which is something I'll talk about. Not going to go and take out pedicles or anything. We can really just free up just from the behind and using those pedicle screws, we can get her straight. So this is her post-operatively. So here's pre-op and post-op.

So the next-- and these are kind of in order of seriousness or bony resection. So we did the Smith Peterson where we just take out this. The next is called the pedicle subtraction osteotomy where we take a wedge of bone out of the vertebral body. That's a little bit, you know, again, a little bit larger dissection, and more bone removal. And in the process, it just means more blood loss. So, obviously, we want to do these in an expeditious fashion.

Go down and make a wedge here, we're working around the nerve roots and the spinal cord and/or fecal sack, depending on what level we are. And then once we have our screws in place, once the bone has been removed properly, we'll connect these rods. And that'll close this wedge down and will restore, hopefully restore, normal alignment.

And so this is a patient. She is 85. She came in. She had this osteoporotic compression fracture. You can see, you can barely see her bone here. She lives here in Winston-Salem. She came in, and said, look, I just I can't get around. My back is killing me. She had pain when she stood up. She would flex forward when she stood up. Can you help me? And I did all those things, sent her to the pool, worked with her, said, look, you're really not going to like this.

And, truth be told, she didn't. So a week after surgery, she said, I would have never done this. I feel like you've killed me. I said, just wait. You're going to be all right. And now every time she comes into the office, she's like the happiest person. She goes around, she takes her shirt off, and shows everybody her scar. She's about three inches taller. And you can see here. I like the contrast here.

I show them here's your abdomen before surgery, not to mention, I always like to look at the spine, but patients are like, look, I've got a flat tummy now. And then after surgery that's her right here. So, again I did the pedicle subtraction osteotomy. Where that fracture was, I took out the pedicle, put screws in, and pulled her up. And so she's now taller. She's not having to work against gravity. And she's doing great.

This is another sagittal plane abnormality, significantly more severe, but kind of in the same family. This patient doesn't even stay on the page here. Because she's so far kyphotic. You can see this is her mandible down below her diaphragm because she's pitched forward so far. And she had this osteoporotic compression fracture that was treated with vertebroplasty. And she just continued to fall over. Now she has-- these are deep brain stimulator generators. She's got Parkinson's.

But she was taken to the OR and had a very similar operation as the one before with the PSO. And we will-- and so, she's two feet taller. But she also started with her head down below her neck. She had chin on chest and doing well. But here's that level where you saw where she started to pitch over.

So for some reason my pictures aren't coming up. But this is one of my favorite baseball players, Yogi Berra. He had some great sayings. "When you come to a fork in the road, take it."

And so we certainly are at a fork in the road when we're staring at the spine. You've got all the nerve roots exposed and most of this for vertebral body taken out. And so sometimes we have to take out the entire vertebral body. So we take the spine and really put it in two parts. We dis-articulate the spine. That's called over a vertebral column resection, where you take out an entire segment.

And here are a few schematics. You know this is the part of the spine-- let's say that we take out-- we first put screws in. And then we take out this entire thing, both the posterior elements but also the vertebral body. So, again, spinal cord, sometimes I have to tie off the nerve roots, although I rarely have to do that. We move the bone, which is the ventral part of the spinal canal, away from the spinal cord, and then take out the rest of this bone.

Once that's out, then you really have the spine in two parts. And at that point you can really do anything with it. And we, of course, would like to straighten it at that point. We don't want to manipulate too much because the spinal cord is still within the cavity, called the spinal canal. But we will put some type of cage in here. This is a titanium boomerang cage. But we'll put a peak or sometimes those expandable cages. But the whole point is to get the spine back straight and get that coronal balance back in line.

So this is a cage going in. We've got the rods in. Once the cage goes in, then we'll tighten down on this side and bring the spine straight. So the current approach to severe deformity, it's all posterior operation. Put pedicle screws in. We do these osteotomies. We monitor the spinal cord continuously with motor evoked potentials and SSEP's. It's a bimodal monitoring of the spinal cord. We use appropriate corrective techniques. And we take advantage of the segmental pedicle screw purchase.

And then there's another saying by Yogi Berra that got cut off, but-- "you got to be careful if you don't know where you're going, otherwise you might not get there." So let's do some cases. And then we'll be done. That's my two-year old, putting my glasses on.

OK, another gentleman with Parkinson's disease, he had this condition where-- it's called head drop and camptocormia where, basically, he loses tone. And so this was him with his head fully as extended as possible. And his head was-- when he just left his head neutral, his chin was completely on his chest, and he was looking straight at the ground. So I took him to the operating room and straightened him out, just did the Smith-Petersen Osteotomy, so just those posterior based osteotomies, put screws in to really C2 and went all the way down to his pelvis. And this is him two years after surgery.

Here's another case. So this is a CEO that lives in Charlotte that had been to four different spine surgeons and somehow got my name, very active tennis player, and Iron Man triathlete. Of course, I just want to point out a couple things from the-- one he has my email to send me. He also has my cell phone number, but you know, Alex-- that's another thing. I mean, and I don't mind my patients calling me Alex, but this, you know-- all know the VIP patient type.

But they call-- he writes in this long email. I've tried to tell my patients, look, I will respond to emails if I can say yes or no. But, you know, this guy wants this. And I'm praying, please go to one of those guys in Charlotte. And he comes here. Great. And I really did not want to treat him.

I mean, you see, he has questions, a very nice guy, very active guy. But he's one of these CEOs that's hired right before a company is going to downsize. So you imagine, nice fella. And he has this. And so he has this degenerative curve that you see here, coronal plane imbalance or balance? If we're going to take this line straight up here, imbalance, right. And he has this thing, which is called a spondylolisthesis where the bone has slid forward on that. But, again, what's our first thing that I wrote three times? Treat the patient.

So he comes in, he just has right leg pain. And so I'm like, eh. And so all the guys that he saw in Charlotte are like, we got to fix your curve. Because as soon as we fuse this and fix your radiculopathy where he's got a pinched nerve, that's going to make everything worse, which is the case sometimes. And so he came to me, and when he-- this is him lying down. And when he's standing up, the curve gets worse. And so I was like, eh, I-- really the conservative thing to do in this guy's is just to fix the curve.

You know, but, you do-- you fix this curve, he's not going to be playing tennis. He's not going to be doing half Iron Man. He's going to be-- he's going to have to work on his golf game. He's probably a bad golfer anyways because he's a CEO. So probably don't want to do that.

So I told him, you know what? Let's just try it. You know we're not going to be burning any bridges. Let's just fix your radiculopathy, which is just that nerve, which is coming all from that spondylolisthesis that I talked about. Here is foramen. So this is the left side which doesn't look great. That's the nerve coming out. But look at his right side. I mean, there's not even a foramen. And that's where he's hurting. So when he'd stand up, his right leg was just killing him.

And so I was number five in line. And I said, no, I don't want to fix your curve or whatever. And he was like, OK, let's come to you. I was like, oh, actually, I want to fix you all the way to your skull. And he didn't like that.

So I did this. So I knew I did PLIF at 51. And I put screws in up to L4. And the reason I did that is because he had these osteophytes here. You can see this bridging bone. That's his body's way of trying to prevent that curve. And your body's going to try to help itself stay in balance.

You know the screws look like-- is anybody here from West Virginia? They look like West Virginia's teeth here. That's a bad joke. I'm kidding. Some my favorite people are from West Virginia. But you see, normally when we look at x-rays, we like to see the screws line up, perfectly lateral. But in this, I knew that they're going to look awful because he still has this curve.

We didn't correct anything. We're really just fixing the nerve root. And I did it. And I wanted to leave town. But I couldn't. And so he still has my email address, right? And so here we are.

And, unfortunately, the date-- but this is like, you know we did the surgery. And this is like a month later. You know, thanks for the time you spent with me. Oh, I'm sorry. This is a pre-op note. Here's the 1st op note, June 29, I'll be seeing you for my July 5th appointment, check the status of my lower back surgery, my sciatic pain is gone. I'm walking reasonably comfortably. But I have some strain and discomfort the base along the right side.

Oh, you know, I'm worried that I backed out a screw. I just put the screws in. And I can promise they're not backed out. But we'll of course check x-rays and still calling me Alex.

And I was certain that I did the wrong thing and all the guys in Charlotte are going to make fun of me, and blah, blah, blah. And then right before Christmas, I'm now Doctor Powers, oh, yeah. I want to thank you for the great job you did surgically on my lower back. It's really exceeding my expectations. And I'm quite active without much pain at all. I have no sciatic pain and sleep very comfortably. Hope you and your family have a great holiday season.

So I got lucky on that one. But, again, trying to look at the patient, I wanted to treat his leg pain. We didn't necessarily have to treat the curve, although, the jury's still out. He's two years out now. He has not been back. I've discharged him from clinic and said, come back when and if you need me. And I've changed the number.

So a 58-year-old female with a 23 degree degenerative curve, has focal pain and bilateral, like so it's not a focal nerve root problem. It's now stenosis. And she has this picture. And this is the level. So she's got an olisthesis here at 5,4, 3, 2. So 2, 3, and this is where she's stenotic. This really doesn't do a whole lot of justice. But when she stands up, she gets claudacatory symptoms.

Do we need to fix all these levels? Because she's got degenerative disk disease throughout. She has this olisthesis. And I decided a minimally invasive lateral inner body fusion. We go through the side and go through the psoas. And so we put this cage in here which is quite large and upfront to continue to give her lordosis that she needs to keep her sagittally in line. But also just this distraction just with putting this cage in opens up her frame, and it opens up the spinal canal.

So here she is four months later. You can see now, it's probably a 10 degree curve, went from 23 to 10. And she's doing well. She was done the day after Christmas this year.

So this is-- I went heli skiing in Alaska a few years ago. This is a guy named Dean Cummings. He's one of the top extreme skiing professionals in the world. It's his outfit. So I was skiing with him. The light started to get flat in the afternoon. And the weather can get real squirrelly in Alaska quickly.

And we were standing at the top of this mountain. It was cold. And the helicopter was-- he's pointing to it. And I was like, I don't see it, Dean. I literally-- and this is about a 48 degree pitch. He's like, all right, we got to ski down there. And I'm like, OK. And so sometimes this profession is like that.

This patient came in to see me. She had been to UAB, Duke, Miami, several other places in the southeast, because her head had fallen down. And I showed you the gentleman before. But this is the actual, this is the index case. He had gotten my name through her. And she said, I want you to fix my neck.

And I was like, well I don't really think it can be fixed. Because if you look in the literature for this condition, there's really not a whole lot of hope for them, that you can put deep brain stimulator electrodes in. You can treat their Parkinson's. But rarely does this get better. And so she went home, and she came back, and said, I want you to your surgery. I said, I don't think we can, came back and said, listen my whole church prayed for me and said you should do your surgery.

And I said, well I cannot go against the whole church. All right, you win. And so this is her, again, rarely do you see the jaw angling down towards the floor. I had to get on the floor to talk to her because her head was down. These are pre-op films. These are her post-op films. And, again, we just put screws in. And do those Smith-Petersen Osteotomies.

She was done close to three years ago, and this is her two weeks ago. So she's standing up and looks great. But, again, very scary to offer something that I had never quite-- Is it going to work? OK, I've got-- we've got a few more to-- so 83-year-old who just retired here because her grand-- or they retired a while ago. But her grandkids are here. She and her husband moved into a house just across the street from a park.

The park if you walk around it in the neighborhood is about a mile. When they moved here two years ago, she and her husband would do two of those laps in the morning and then one at night. And then she is just incrementally decreased to the point that she couldn't walk around. So she really had to get all her work done by 10:00, or else she would be so severely fatigued that she just couldn't walk.

And so she came to me and said, can you fix me? And, you know, she's coronally, not too bad, sagittaly, not too bad. But when you see these wide sweeping curves here, they generally imply that they're going to have issues in terms of fatigue. The focal curves tend to, for some reason, I don't know, they tend not to have the fatigue issues like that.

So I gave her the talk. And we went through all the non-operative stuff. And she wanted to have the surgery. And so I took her the operating room. And she is just the nicest person in the world, you can imagine. And we are going along and doing our case, and we get all of her screws in, we get one rod in, and we lose her blood pressure. And she was like this. This is the final tightening device that I'm now putting on because we have one rod in.

And we're losing her blood pressure. Now we're losing-- her heart rates going away. And anesthesia is like, you've got to turn her. And this is not a wound that you close expeditiously. A few of you were in the room during this time. And so I, at that point, thought I'd rather be here.

This is a Captiva Florida. It's one of my favorite places on earth. And I did not want to be in that room, did not want to be taking care of this person. You know, I just wanted to be away. But, you know, sometimes we don't get what we want.

And so we put an ioban on her, flipped her over, the anesthesia resident is on top of her in her bed giving chest compressions. And I just thought, you know what, we got to just reconsider doing this kind of surgery. This is probably not the best thing to do.

But you know the patients do so well. So what? You know, I still am at a loss. But we get her resuscitated. She goes out to the floor. And here's again her curve. As soon as she wakes up, she's like, why didn't you finish? I was like, because you tried to die on me. She's like, well when am I going back? When am I getting my other rod?

I was like, just wait, you know. So a week later we took her back. That surgery went fine. We resuscitated her. She got better, even after that second surgery, which was just a week later, she went to the floor.

It's truly amazing, I mean, she was out. We shocked her. She got chest compressions. She had rib fractures. I mean, it's obviously a big deal doing elective spinal surgery. And so I told her, I said, you know, you may have just taken several years off my life. And she thought and still thinks that's funny. So she's now walking independently in clinic and looks great and loves to point out the gray in my hair because I always say this is because of you.

Sometimes these patients need revision surgery. So this is one that I probably, again, you know, the bone quality, when you have a hard time making out the vertebral bodies just on the x-ray that means that they don't have a whole lot of calcium in their bones. I know, it takes me kind of a-- I'm a slow learner. But, obviously, she's a osteoporotic.

When you see this sign, the ribs on the pelvis, that's usually a good sign that they will get better. Because patients when they have ribs on their pelvis that really, really hurts and that also they have a tough time eating food because their intra-abdominal pressure goes up. And so just getting-- just improving that alone I found really helps.

But she was-- the reason I show her is that I did one of those pedicle subtraction osteotomies, fixed her in a great position, which I thought-- But, again, with bad bone, she comes in, and she's now pulling out of the top of her screws, so we had to go up into her neck. But she took that and is doing well.

We can go through this. So in conclusions, adults spinal deformity surgery in 2013 is alive and advancing. Again, always treat the patient. If you see somebody with a curve that doesn't mean-- listen, there's this guy over at Wake that will fix you. That's, I mean, I'll be more than happy to talk to them. But that's literally not even on the top 100 things to do to the patient. We want to think about fixing the curve item number 570.

We want to do everything before. We want to exhaust all non operative therapies. Surgery is successful and not necessarily for the young. My oldest patient that I've done one of these very long like cervical to pelvis fusion is 86. And they've done well. You know, again, it's physiologic age. It's not necessarily their chronologic age.

It does carry a very high perioperative complication rate. So in the largest study to date, these patients have a 70%-- let me repeat that 70-- there's no other surgery that people sign up for when you say 70% complications. They'd be like, oh my gosh. The hospital would shut down. However, they get better. And in that paper that showed 70% complication rate, the patients that had the largest margin of benefit were the older ones.

So the ones that had the highest complications, once they get over them -- now the complications were things like UTIs and DVTs and wound infections and major blood loss requiring transfusion, those kinds of things. However, those patients where the ones that had the greatest benefit. And I'll tell you that of my practice the older patient that's got the rib on the pelvis or severe kyphosis, severe spinal imbalance that we fix, their hands down the most happy.

Now they're not most happy for the first three months after surgery. But they do get around. And once they heal up, they're great. So with that, does anybody have any questions?