



TRANSCRIPT: MARTHA CARTER INTERVIEWS ESTEEMED ORTHOPEDIC SURGEON, DR. STEPHEN TREDWELL

What is scoliosis and why do some people need surgery?

Scoliosis is a fascinating deformity of the spine. And there are many ways to get there. Scoliosis itself just means a twisted spine. And it's not a C shaped single dimension curve, it's actually a helix. So the spine twists that way, and it can collapse down on itself. And as it collapses down on itself, several things can happen. If the main curve is up in the chest then as it collapses down, there's less lung room. So small and medium sized curves have normal lung function. Large curves start to have lung function that gets a little compromised. Very large curves have lung function that gets very compromised. The heart is sitting in the chest and it's got to pump the blood around. So very large curves with some lung function problems can also get heart problems.

But very unlikely if it's a mild, medium curve. The medium ones, when you finish growing, your own body's righting reflexes and everything take over, and it's not going to get any worse. Once you get to that magic tipping point, which is somewhere around fifty degrees to sixty degrees, (you know three hundred and sixty degree circle, curve is a piece of circle, so a piece of circle of around fifty to sixty degrees, somewhere in there), there's a tipping point that you can't quite control, and then the curve just slowly slides and gets worse.

The other interesting thing that happens to spines is they've got a lot of little joints in them, that's why we can move. Those little joints are designed to be like this, they're not designed to be like that. And if they're like that they wear out. So people with scoliosis, one would expect them to get arthritis of the spine in their mid to late adult life, and yes indeed that happens. So it's not uncommon to see even a moderate curve turn up in someone in their sixties with severe, unremitting, almost unsolvable back pain because of the large number of vertebrae involved in the degenerative arthritis process.

Who gets scoliosis and why?

If you take a cross section of the population, and you look at all fourteen year old women, okay, you'll find about twenty out of every thousand with some kind of curve. Small curve, but they might not even know they have, medium, large, whatever. If you're talking about a large curve, the kind you had, you're talking more in the terms of maybe one in every five thousand population. It's a growth pattern problem, and young women have different growth pattern than young men do. It's earlier in their life, it happens very quickly, on a very slender trunk. We have no evidence to suggest that an accident that doesn't break the spine causes a subsequent curve.



How is scoliosis diagnosed?

People don't notice their curve. I mean it's behind you, you're not gonna go look at it. Thirteen year old girls do not run around in the nude saying to their parents hey look at my body, so it's not uncommon for these to sort of crop up. We used to see them in the summer with the new bathing suit going on, and the parent looking at the back saying "hey that didn't look like that last summer!" And because they increase fairly quickly, you know a matter of six or seven months and you're gonna have a curve that is large and getting larger. We used to have some school screening where all the children would bend over at school, and people would look at their backs. And like a lot of well- intentioned interventions, that one had more downsides than upsides. It had a tremendous amount of false positives where they thought there was a curve, so they ended up getting x-rays, which are not innocuous, to find a normal back. We keep working on screening programs. Right now the best screening program is a family doctor, and that one has worked better than anything else.

Why do some curves get worse than others?

It requires something else to make a small curve get large, maybe the rapidity of growth, maybe the slenderness of the trunk. Maybe some pre-existing minor imbalance that's there that gets exaggerated. Polygenic is probably the nicest sort of euphemism. That is, yes it might be familial and genetic, but there's all kinds of little things that have to be there to give you a big curve. So yes, they run in families, no, they don't run like blue eyes and blonde hair where every child's gonna get 'em. So the sedentary, stay-at-home artist who's drawing all day everyday and the Olympic sprinter both have the same risk if they have the same genetic sort of make up.

What is the history of Harrington Rod surgery?

Surgical procedures evolved in many areas sort of simultaneously. And spine surgery in the fifties had largely been on polio, which causes a paralytic collapse of the spine, very difficult to treat with a very, very high complication rate. And the breakthrough came with a chap named Paul Harrington in Texas, who, rather than just putting bone graft in to hold the spine or just trying to hold the operated spine in the cast, had the idea of putting a metal implant much like a jack, you know to jack up the spine, and hold it there while it was healing.

And he started there, and there was a small group of people very interested in spine surgery called the Scoliosis Research Society. And they got together once a year and shared ideas. So when Paul Harrington presented his concept, the people in Minnesota, which was another big spine center, people in Toronto, and Bill Thompson from Vancouver all took away different parts of the discussion. And over the next five or ten years it slowly evolved into what became known as the Harrington method and the Harrington Rod, which was a fusion with the rods supported by a cast, later on a brace, to control the curves.



How has the surgery changed over the years?

The procedure then and the procedure now have a lot in common. The object is to take a deformity of the spine that is slowly increasing and will eventually cause the person damage, to correct it back as far as one can without getting them into complication trouble, and then holding it there somehow. Okay so that's the basic concept, the same now as we did then. Then, we had an implant system that was brand new, that was tremendously better than what we'd been using, but still had some difficulties. It wasn't as stable. I mean we could elevate somebody up, but they could still do this a little bit so had to control that by putting a cast on them. It was only held at either end really, the stuff in the middle did a little bit, but not like today where the parts in the middle do a lot. And so we had to lie people down for awhile to let the spine fusion start to take.

You would be in hospital for about two or three weeks on a narrow, narrow bed that wouldn't allow you to move, sort of like a diving board [laughs]. Yeah, and we'd hold you on this little frame and then we wouldn't let you turn cause we'd put a top on that frame like it was a sandwich, turn it over, and then you'd be on your tummy and then back on your back again. We didn't want any movement at all. And then when things had healed a little bit we put this cast on, which we naively regarded as being a huge improvement over lying in bed on the striker frame of course. The patients when they got this turtle shell on sort of got a little claustrophobic, I'm sure. And then home you would go.

What is the newer surgical procedure, the Cotrel-dubousset method?

There was a chap in France named Yves Cotrel who came up with a concept that if you put a hook at either end of a rod and push out, you have hooks bearing a lot of force, and yes it works. What if you put a whole pile of little hooks in between, and they each pushed, then each one would have a little bit of force so that you wouldn't be putting the same global amount on one part, and maybe instrument wouldn't fail? And maybe it might be a little more secure? Well, he was absolutely right. And his modification of the rod was another big turning event. And so now the rods are titanium, they're attached with both screws and hooks, there's multiple fixation points. And just to compress you know twenty years of evolution down into a sentence and a half, we can now get the person up as soon as they can tolerate getting out of bed a day or two after surgery. We don't worry about the stability of the implant anymore, it's fine. You heal just as well getting up and walking, probably better than you do lying around. And you get home faster, and you get back to school a couple weeks later. So the social impact of the curve is a little less now than it was then. It's still a major insult to anybody, the invasion of your body and having somebody rearrange you and put all these things in. It is not comfortable as you may recall. So it's still a big deal, but technology's helped us a lot. And the ability to monitor people while they're asleep to make sure that their muscles are still moving properly, that's another great big advance.



What is it like for you to be a surgeon performing these procedures?

Most of my patients I got to know reasonably well. The more I knew them, the more involved in the surgery I became obviously. It's a bit of a scary tightrope because this surgery does have complications, and these complications can be major, can have major bleeding. You can do major bone damage, you can paralyze people doing spine surgery. So that's sitting over here. It's technically demanding in that there's lots of little fiddly things to do, and you have to do them all right. And so that technical side of the operation requires a fair amount of attention. And so you tend to start off focused on everything, and then as the surgery goes along you focus in, in, in on minutiae because everything has to go in line. And then once you get that, then you can broaden your focus again. In the OR there's a team. I mean this isn't a surgeon sitting there doing it. I couldn't do the surgery that I did in other hospitals because the team was at Children's Hospital. So the anesthetic team that could give a beautiful anesthetic, take people down lightly, control pain as they're waking up, keep the blood pressure where it should be so blood loss was small, and you know really hugely important.

The nursing team knew what I was gonna do next, so I didn't have to keep turning around and saying "oh hey that instrument over there", so then it would break my focus. So you know, they're there to make sure that things go right. We can tell how the spinal cord is working when a patient's asleep. We can stimulate the sole of the foot with a tiny electric current, and we can pick up that electric current in the brain. We can stimulate up here and pick up it up down in the foot. And that says that the spinal cord is working. Well this is a spine procedure, paraplegia is a risk. So this little group of what I used to call my guardian angels would be there telling me you're okay, you're okay, it's going alright [laughs]. And cause you can't tell, the patient's asleep. They're not gonna say hey by the way I'm having a little trouble moving my foot now. So, so it's a big event, lots of people. Lots of attention to detail by everybody. It can last anywhere from four to eight hours. And you don't even notice the time go. You start, and then you finish, "oh it's four o'clock in the afternoon, isn't that interesting". And the fatigue hits you later.

How did you become one of the leading scoliosis surgeons in Vancouver, Canada?

Medical school seven years, orthopaedic training was another five. I did a sixth year doing a little research, did another year and a bit doing the spine surgery as I went around the world. About thirteen years in all. And then it takes a good mentor to take that newly formed spine surgeon, and turn them into a reasonable clinician. And that's what Bill Thompson did as I joined him as a junior partner. And you think you know it all, of course. You know you're in your early thirties, you've been going to school forever, and it's over now. And then the hard part to realize is the next five years you're gonna learn a lot of stuff on management that you never thought to ask. And then you go.



How have you noticed surgery affecting teenagers emotionally?

As an event, it took most of the year. Now when we're thirteen years old, that's one thirteenth of our life. And spending one thirteenth of your life focusing on one particular problem makes a big impression on one. Being away from your peer group at a time when peer groups are forming has a big impact on young men and women. Taking a young woman who's becoming a young woman and realizing sexuality or attractiveness, and surrounding her in a plaster bucket moves things backward a little. So I think the non-physical impact of the surgery in the sixties and seventies was probably a lot higher than we thought it was. Now on the upside of both sixties, seventies and now, the self esteem and self image a year or two later has been a very gratifying improvement.

How do you advise teenagers and their parents about the surgery?

Early on, one's focused on the technique and the technical stuff, and you've got to get that down. Then you start realizing the impact of this surgery on the patients, and realizing that just doing it mechanically perfect isn't going to be enough. So you have to take people into the operation as relaxed as they can be. And it took me about five years of practice before I realized that what we were doing in the office wasn't enough. We would talk to people about the surgery and so. You know I'd understand it. Parents would seem to understand it, and the young girl starts to turn, nod her head shyly in that background. That wasn't quite good enough. So we'd talk about what scoliosis was, what it meant to have a curve, what the possible things can happen, what the surgery was all about, what could go right, what could go wrong, ah right down to telling some poor little girl that yes it's possible that some people go paralyzed in this. And this is why we're gonna do it this way, and these are the people who are going to be in the room to help us, and that's why they're there, and this is why we have such a big team.

And it became a lot easier the more information you gave to people, even though you don't wanna scare people. But the more you gave them, the more they seem to be able to appreciate things. So they came in a little more relaxed. People in their teens are a lot more intelligent, a lot more with it than we give them credit for. So if you give them credit, yeah, they're going to be different now. We just didn't do that then. Nearing the end of my practice for these counselling sessions that we would have, I'd say well yes your parents have to come, which one comes is up to you. You can invite both parents, a parent, but you have to be there because, I'm talking to you. I'm not talking to them. They're important to be there, yes that's fine, but they sit in the background, you and I talk. On the other end, as we follow people along in the clinic, again it's not enough to show them an x-ray that says hey your spine is in balance and it's all healed because they're worried about the shoulder that's up a little bit. Or they're worried about the fact that they're now two inches taller than they were before.



Is it possible to have the rods removed?

A small number of people that for some reason or other having that rod in their back, even though the rod's not moving, even though it's partly covered in bone, it's there and it doesn't feel right. In some people, this builds up, and it's this sense it's not part of me and it's in me and I need it out of me because it's not part of me. And sometimes you have to listen to that. So occasionally we'll take them out. Once the fusion has occurred and the bones have grown together, the implant is a passive passenger. It's just there. You don't really need it. It sometimes gets encrusted with bone and sometimes doesn't. Taking it out is another operation, and can be actually fairly elaborate. So our tendency was to try and leave them in if we possibly could.

How much pain do people experience? Before surgery? After?

Before, there's a huge range; from nothing at all- my mother noticed this thing and she dragged me down here to see you and I don't think there's anything wrong -which is classic thirteen [laughs]. And then you take the x-ray picture and they say, oh my god you know, I'm falling apart. To I've had quite a few young women come in saying you know right in here between my shoulders ache, and it's been getting worse, and I'm getting stiffer. And of course they're talking about a curve getting bigger. So you can have zero symptoms before up to significant inter-scapular back pain. And afterwards you can have the same thing. You can have some people who walk away, forget all about it. You have other people who say, "you know these muscles don't work right". Well you're probably correct because the spine is fused and the muscles aren't doing their thing. The muscles can rub over the rod, and that can irritate some people and get almost like a bursitis in their spine. And that can be quite uncomfortable cause then you can't stand up straight in choir practice, and when you do this movement in your sports it's irritating. The spine is supposed to be flexible, and you've made it rigid.

Well you've taken a second best. You have a deformity that's collapsing and gonna cause harm, you take it back where it's not gonna cause harm, but it may get stiff. So it's not normal. We're not good enough yet to correct it and still have it mobile. That would be the ultimate. So we have a stiff spine, but where it meets the normal spine above and below is flexible. So the stiff part and the normal part, right there there's gonna be increased motion, and so you'll get in some people the fatigue or the discomfort of having too much play at one vertebral level. And maybe a little bit of joint fatigue there. So the pain in between the shoulder blades still happens. The grumbling pain above and below the rods in some people still happens. The more active they are to a degree, the less they notice it. And then if they're too active, they notice it, and if they're too inactive they also notice it.



What are some of the post-surgical problems some people face?

What we used to tell people after surgery is for the first year after the cast comes off, you can walk and you can dance slow dances period. And the reason for that is one of the weaknesses of the old Harrington Rod was the bottom hook. If you bent too far forward, sometimes you could pop it out, which in early healing wasn't a good idea because then things would collapse down and you'd have to go back and put them in again. After it healed, you're probably okay. But being conservative by nature, most surgeons would extend that one year period to three, four, five or six years just to be on the safe side. And yeah we did have a few pop out, not many. As the technologies got better and the implants have improved, it gets harder and harder to get an implant failure. So we're a lot more liberal in what we let people do. Soft tissue irritation after surgery, that's the group we're gonna talk about here. And that after surgery can be five years later, it can be ten years later. We've got a foreign thing in your body, and we've made the center of your spine stiff. And the soft tissues overlying are going to react differently than they do in my back. There's scarring there, and sometimes scarring gets stiff. There's the ability for the tissue to rub over the rod like we talked about before, getting bursitis. There's muscles that aren't used properly and because the spine that they normally move isn't moving anymore and those little muscles atrophy. They're really easy to injure sometimes. So for a variety of things people would come in.

What do you recommend to relieve pain?

Well first thing is how active are you? Because sedentary is not my preferred mode for people who've had surgery. I like them to be active, and again doing what they do, want to do. So first of all you explore how active are you, what do you like to do, can we get you doing more of it? Can we get you doing anything if you're not doing anything? [laughs]. Let's go walking, let's go swimming, let's go you know, let's build up these muscles. The muscles that aren't used very much now that the spine is fused, can we build them up another way? Rowing happens to be a really interesting sport for that because rowing will build up some of those muscles. So people who can't get over it with just normal activity, why don't you try rowing, see if we can build up some of those muscles. And I encourage people to explore. Okay, go see a massage therapist for awhile, see if it helps. Go see a physiotherapist, see if it helps. Find yourself a chiropractor that you can talk to that you know you can say "look." See which one works for you because different ones will work for different people. Then when you got that, use that as your first aid like the aspirin you take when you get a back ache. Don't use it as your daily dose cause your daily dose is you being active and using your body. So use your body, keep it healthy, keep the weight where it's supposed to be, the good diet, all the things that people hear again and again and don't do. That takes care of most, doesn't take care of all. Occasionally you'll have someone who has a point of tenderness area that flares up every now and then, and nothing that anybody can do will help it, occasionally we'll inject those. Sometimes it helps, sometime it doesn't.



What do you say to people who don't want the surgery?

That you're right, you're not dying of this. There are some medical problems you might get into later, and let's do your lung functions now and see what they're like. And please don't run away, please come back and see us. And there are patients that I had that I would see about twice a year for four, five, six years, the curve slowly increasing, but they didn't want to have anything done. That's fine. We can do the surgery in your twenties, thirties, forties if we have to. It gets more difficult, but the end result of doing surgery on someone who's unwilling to have it done on them is terrible because you can never get a result that they want cause they wanted to be left alone.

What physical activities are allowed after surgery?

Just about anything except hand gliding, skydiving, bungee jumping [laughs]. Although I have had patients who've done them all, and gleefully write me postcards to say see I did it [laughs]. I think it's what are you adept at, what turns you on, can you do it without discomfort? And if you can, go ahead. If you have discomfort, why are you having discomfort? If you're stressing your body beyond what it wants to, maybe you should listen. But remember, you have after this surgery a rigid segment in your back that doesn't move the way it should. So things that would injure a normal back, will injure this back worse. Snowboarding is an obvious sport. It has one of the highest back injury incidences of any sport in the normal back. So should people who've had scoliosis surgery snowboard? I'd be happy if they didn't because I'm too attached to them to have them injure themselves, but that's more of a parental thing than it is a scientific thing. So you try and tell people that this is a high risk sport, you have a high risk situation. Putting the two together might not be a good idea, although I still have lots of snowboarders [laughs].

So we're pretty liberal. The difficulty we have where that fuse segment stops and the mobile segment starts, can wear. It can be uncomfortable if you do too much. If it starts happening, sorry you're gonna have to lay off until it gets better. But the stronger the trunk, the better the spine. So yeah we encourage them to be more active, but not hugely so. Things like marathons okay, fifteen hundred foot strikes to the kilometer, that's fifteen hundred with me a hundred and ninety pounds coming down on either side of my spine. Now that fifteen hundred jolts per kilometer, well if I've got a stiff spine sooner or later that's gonna give me trouble. Hand gliding and skydiving, well they're there, but you know you've got a back that isn't as flexible as it could be. And if it happens to land on the ground, you're not gonna bounce like I might bounce. So you know just try and add what you've got to it, you know.

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