Academy of PHYSICAL MEDICINE

Transcript

Orthopaedic Case Histories
With Nick Birch

APM: So this evening, for the second time, I'm joined in the studio by Nick Birch who is the specialist spinal consultant at the Chris Moody Centre in Northampton which is a fantastic multi-disciplinary centre dealing with all sorts of orthopedic problems. He himself was a spinal surgeon but has retired from spinal surgery and now offers second opinions and conservative advice and other advice to patients at the Chris Moody Centre. He is the specialist consultant for The Bone and Joint Journal and he has various other expert capacities within the orthopedic world. Nick, great to have you with us—

NB: Thanks, Steven.

APM: --in this swelteringly hot night. I hope we both survive this this evening. What we're planning to do this evening is to go through some case histories which Nick has been kind enough to bring in for us and the purpose of that is to look at some complicated case histories, view what was done conservatively or not done conservatively, what Nick's recommendations were and perhaps what the rehabilitation implications are for those patients. We've also got some equipment to demonstrate for you and we have some interesting footage of someone who can only be described as a bit of a madman right at the end of the session. So do stay on for that because that will be very interesting. Nick, what have you got for us, first of all?

NB: Well, starting off with a 35-year-old lady from Bangladesh. So this was a second opinion I was asked to give about six months ago. She's got quite a complicated situation with both neck pain and lumbar spine pain. The neck pain is associated with some right sided shoulder and soft arm pain, so not really hard neurological symptoms, very persistent, not responding to what she considers to be conservative treatment. So she's had physiotherapy but no real evidence that it's being done in a structural and logical way. Lumbar spine pain, much the same. Back pain, plus some leg symptoms into the

buttock a bit but no real sciatica, no significant neurological symptoms and no red flags for cauda equina. So she's been going for 2, 3 years now and she's seen a professor of neurosurgery in Bangladesh who's recommended some fairly complicated treatment. What he wants to do is to inject her discs in a process called discography and when he's found out the one or ones that are causing the problem, he wants to put in some disc replacements and he doesn't want to do it all at one go. He wants to do one disc and then see if another one's sore and then do that and then go to the lumbar spine, do that. So she's in a turmoil because she's 31, she's a mother and she wants to know, "What am I to do?"

APM: And so she started off in Bangladesh where she saw the surgeon, the consultant there. Did she get her physiotherapy in Bangladesh?

NB: She did, yeah.

APM: So were you aware of what that physiotherapy involved? Do you have an opinion on whether it would be similar to physio in this country?

NB: No, I don't. I mean it may well be similar to physiotherapy but the trouble is with all of these regimes is that they can be either very focused or very widespread like a shotgun and you really don't know. So unless you've got some really good data as to what they've done, have they gone through a process of manipulation, massage, exercises, etcetera and had done everything they should have done, you just don't know. So we had to start from the beginning and so to say, "Let's assume you've actually had nothing done."

APM: Was she able to describe anything that was done to her beforehand?

NB: No, I didn't get that information.

APM: Injecting the discs in order to discern which ones need replacement, what goes on in that process?

NB: So if you pressurize a disc from the inside, the theory is that you stretch the capsular disc, the outer part of the annulus. So it's only the outer six layers of the annulus that are actually innovated and by doing that, you then should reproduce the pain that's coming from that disc. That's the theory. Go back 20 years, we used to do it all the time. We absolutely believe that discography was the way that we could tell whether somebody had a painful disc or not a painful disc and that was the justification for a lot of surgery. Subsequently, we realized, actually, that you can inject a painful disc and it might not be painful. You can inject a disc that's not actually abnormal on the MRI scan and it might give you pain. So we don't really know and then to really kill off the test, there was a good paper from Los Angeles published about 3 or 4 years ago, showing that if you do inject a disc that is normal on

an MRI scan, you get quite rapid accelerated degeneration. So you can make the situation worse 2 or 3 years down the line. So most people in the west have completely discarded discography as an outdated and out noted method of investigation. We are on other mechanisms now.

APM: It surprises me to some extent because I know this is Bangladesh but one hears an awful lot about surgical tourism to India, for example, where presumably, the standards are very high or people wouldn't be doing that. Is Bangladesh a different caliber —

NB: No, I don't think so. I think the people in Bangladesh are just as good as in India and they're almost just as good as in the UK and Germany and the US because a lot of them train there which is fine. They're limited by their resources. So they've got plenty of money. It's fine. If you've got limited resources then obviously, there's going to be a limit as to what you can achieve but by and large, their standard of medicine is excellent and the process that they go through is logical. I think the problem comes down to when individuals have a particular idea as to how things should work out and how they should investigate people and then what they should do it and, you know, the idea that you're going to do four disc replacements on somebody, two on the nape, two on the lumbar spine, staged over a period of six months or a year or whatever else and this woman's got to get on with her life, that doesn't seem to be terribly sensible to me.

APM: I'm not going to presume that the disc replacements were indicated necessarily but if they were, would you have done all four at once?

NB: No because I think what he should be doing is if you're going to operate on one part of the spine, you should concentrate on that. If you think about the spine as a pyramid, it's the base of the pyramid that governs what happens to the rest of it. So if you get the lumbar spine right, quite frequently, the rest of the spine will settle down. So treat the lumbar spine and then see what happens to the rest because quite a lot of times, the neck pain will actually go away or at least get much better, they can cope with it. Take away one source of pain and the other source of pain becomes manageable. So actually, I wouldn't do that. I'd actually pick the bit that was the most severe, be the neck or the lumbar spine. Concentrate on getting that right by the least invasive mechanism possible and if necessary, OK, go to some sort of surgical procedure if that's what is indicated. Then give it a period of a year or two, let her get over that. Let it sort of sort out. Let her family get over the fact that she's had some surgery and having done that then see what the outcome is.

APM: So if discography is no longer practiced in the west, what's the alternative? In terms of analyzing what's going on, is it simply MRI?

NB: Well no, a combination, one, a really good history, two, examination findings. Three, the MRI scan and trying to correlate what the MRI scan shows with the clinical presentation, remembering, of course, that the MRI scan is a picture of what you look like, not what you feel like. So we have to be very careful about interpreting changes on MRI scan actually that means something. But now we've got better tests. So we've got something called SPECT and SPECT is a combination of a brain scan with a CT scan and what is shows is the activity of osteoblasts, bone forming cells. We are pretty convinced that that actually correlates much better with pain sources in the spine than with any other test we've ever come across. It's not invasive in the sense that you don't stick a needle into a disc. You obviously have to have an injection or bone scan and it's obviously got an associated radiation dose because of the CT and the brain scan but if you are looking for a single pain source and you cannot identify it by any means, it's a good test.

APM: What about provocative test? I mean presumably, you would go through an array of those in terms of your analysis. What would you have been doing for this neck?

NB: Once I've actually done all the clinical side of things, if I'm done thinking about surgery then I'd inject the relevant facet joints because we know that in the neck, the disc themselves are rarely the cause of mechanical neck pain. They're the cause of radiating pain. They're the cause of neurological symptoms. They're the cause of myelopathy but not usually mechanical pain. That usually comes from the cervical facet joints and if that have been the case, I've had a lot of experience with injecting cervical facets and then having treatment after that. So what you do is you create a window of opportunity. You calm the pain down, allow the patient then to undergo their rehabilitation and very frequently, they don't need anything more than that. Sometimes if you get a good response in the first instance but it's temporary, you need a second one and if you then get a second good response but it's temporary then you can do facet joint denervation. So you effectively burn the nerves and you actually take away the messages going to the brain and you give them a pain free state. If you can give them a pain free state for 6 or 8 months, very frequently, the therapy will then work.

APM: How precise is that? I mean can you burn just those efferent nerve signals away?

NB: The guys who do it say yes because the anatomy is pretty clear. So the posterior primary ramus comes up from the exiting nerve root up and over the articularis then branches north and south, goes to the facet joint above, facet joint below. You can see exactly where that pars is and the lumbar spine is easier because obviously, everything's bigger. Even the cervical spine, it's actually not too difficult to see. If you can get past facet joint osteophytes which can be quite an obstruction at times…so you get down onto the pars and then you heat that area up to 90^{o}C for 30 seconds and that's a pretty

effective way of denervating both the joint above and the joint below. You have to do one above and below because you've obviously got that joint…that nerve coming up and the nerve coming down. So usually, for two levels, you're looking at 2 or 3 levels to denervate.

APM: And we had our first contribution from the audience. How's your glass of water, Nick?

NB: It's all right.

APM: Mine's all right as well. The people out there, been sending in messages, telling us what they're drinking.

NB: Excellent —

APM: We've got a cool smoothie, a Pinot Grigio, a Prosecco, gin and squash and a pomegranate juice. So please, do keep that coming in. Please tell us how you're enjoying yourselves while we're sweltering away in here. What about…I mean when I said provocative tests, I was thinking of things that we were taught in college, things like compression tests and quadrant tests on the neck. Do you do things like that?

NB: No. Compression tests, I think of…in medical practice, they used to be quite popular because they actually form part of the tests that Waddell introduced to find out whether actually people had pain that they thought was just psychological or real but that's been really rather discredited since we've become much more aware of the mechanisms of chronic pain. So we've kind of moved away from that and I probably included those sorts of manipulative osteopathic type tests in my practice because that's just not the way I was trained or was brought up and, you know, I'm now too old and too much of an old dog to learn new tricks.

APM: So what tricks did you play on this lady?

NB: Well, my opinion was…can we have a look at the x-rays? The MRIs, because when you look at the scans —

[Audio cut]

APM: I'm sure the audience can work out which disc we're talking about despite the lack of a pointer. You said there's inflammatory change. That's the white signal around the edge of —

[Audio cut]

NB: …. There are other sequences you can have such as fat suppression. So if you want to, for instance, see whether this area here, that inflammatory area,

really is fluid or is it fat, what you can then do is by tweaking the software, you can turn the fat signal down and you bring the fluid up and that can make it stand out. So that's almost like a change to the contrast really.

APM: So all this waiting is done post after…post the MRI, so —

NB: So you do the standard sequence because you have to actually decide that if you want a fat suppression sequence, you have to press the button to make it happen. So that's just sort of whatever it takes, five minutes to do that.

APM: So we've got a dark disc. We've got inflammation around the edges of this.

NB: Well, we think there's some inflammation but I can't see much darkness on the T1 signal. So it might actually be an old change. It could be fatty change. So these are called Modic changes. Michael Modic was the radiologist in Dallas who described these back in the late 1980's. What we know is that acute inflammation in the vertebrae, adjacent to a disc is…it is inflammation. So that on a T2 is going to be bright and on the T1, dark. If you go beyond that stage and actually, that begins to heal, what you get is fatty replacement and that's bright on a T2 but it's not bright or it can be bright on T1 but it'll be neutral. So we know by looking at this whether it's acute or whether it's chronic and actually, my interpretation of this is this has been going on for quite a long time. It's quite chronic and that then changes the way you treat it because if you got something that's been going for quite a long time then you're a long way down that degenerative pathway and actually, then you start to think about the natural history because the disc that degenerates, goes on to degenerate will become stiffer and stiffer and eventually will stop hurting. So unless you've got a really good reason to operate on it because you've got pain in the arm or neurological symptoms, actually, leaving something alone can often then be the best way to treat it because the natural history's benign for most of these conditions. And you as an osteopath wouldn't dream of referring someone to a surgeon just because they have neck pain, would you?

APM: No.

NB: So because you actually treat it conservatively, etcetera, you know that most people, they're going to get better. They might have episodes, that's absolutely fine but with knowledge and reassurance, they're actually going to be able to manage it quite well.

APM: We are, of course, all desperately concerned that we don't go manipulating necks when there's a risk to…of herniation or prolapse to those discs. This old and degenerate disc, how much at risk is that or is it fairly solid?

NB: I think it's pretty solid. What we haven't got are x-rays, inflection, extension. So if you do a lateral x-ray, inflection, extension, you could see whether there

is movement there and if actually that disc doesn't move at all, it's fused. If it's fused, it's not causing you trouble. Therefore, Mr. Chop-A-Lot, neurosurgeon shouldn't be operating on a disc that have fused up already. So that's really the rationale and the big problem we have, particularly in spine, is there are different disciplines coming from the surgical sides of things, some of whom look at you as an individual, as a whole person, starts thinking, "How can I manage you?" Others look at the scan and think, "That's actually an alternative for examinatio," and I suspect, actually, in this case, that she's come across someone who's a surgical enthusiast and just been looking at scans and not looking at her.

APM: It's not uncommon though, is it?

NB: No... -

APM: Because as people say, if all you've got is a hammer.

NB: Indeed. Yeah, indeed, then everything does look like a nail and actually, that's fine as long as you're dealing with brain tumors or aneurysms or things that can actually respond to surgery. The problem with spinal pain is that it only responds to surgery in a very, very small number of cases.

APM: Have you got any idea, in this instance, what might have caused this problem in such a young patient? She's 35, you said.

NB: Yes. We know very clearly now from a lot of work done over the last 10 or 15 years, mainly from twin studies that about 70% to 80% of the reasons why people have disc degeneration is genetically determined. So you inherit it from somebody in your family, one side or the other and it might skip a generation but it'll be there somewhere and only 25% to 30% is actually what you do in life. It's environmental. So if you've got the genetic predisposition and then something happens then you will get degeneration and you'll start to get symptoms but don't forget, you can have lots of degeneration in your spine and have no pain. You can have a normal looking spine in an MRI scan and have a lot of pain because actually, the MRI scan, as I said earlier, isn't actually to finding where your pain's coming from. We haven't got a pain scanner. Love to have one. The SPECT gets as close to being a pain scanner as we can possibly have with modern technology but it isn't yet a pain scanner. I haven't got a machine of a coder which is what Spock has and he goes [making scanning sound] and he can tell you what the diagnosis is which —

APM: I think you'll find it's McCoy, isn't it?

NB: McCoy, sorry. Sorry, you're right. It's McCoy. Long time since I watched that.

APM: Good. When this lady came to you, 35, she must be quite concerned about having this degree of pain at her age and she's been told that surgery's what

she needs and that's going to interfere with her life but a lot of people will say, "Well, you know, I want a quick solution," and I imagine a lot of patients, informed or otherwise, will think, "Well, surgery is a quick solution and I'm going to get full resolution from this and that's what I should go for." This is important to us in terms of our communication with patients. How do you deal with a patient who really may be quite keen on surgery?

NB: Let's split up into two aspects, one of which is have they got radiating pain because that is the quick solution, if you like, arm pain and leg pain. That's really important, that distinction. The other is have you got axial pain or is it neck and low back pain and they're two different things. So if you came along to me and you had terrible cervical brachialgia, pain going down to the back of your hand, at the C7 distribution and you had a wrist drop and you had a great big disc in your neck and it'd be going for 3 or 4 weeks, you can't sleep, you can't make any decisions, you know, you're going off your head with the pain, that's an easy one. You do an operation because it's…essentially, that's quite an easy decision. That's the quick fix. The longer term one —

APM: And you would invariably, in circumstances like that, find a correlation with the MRI image because you —

NB: Yes. So in arm pain and leg pain, the correlation is it's very good in majority of cases but not all cases, the majority of the case. So you have a big disc and you've got a radicular syndrome that is absolutely, you know, concordant with that disc then you can be pretty sure that by doing something to that then you're going to make the patient better. There are one or two caveats. One caveat is that if you've got something pressing on a nerve and it presses hard enough and it turns the nerve off, you might not necessarily get the function back. So we don't ever do surgery just for things like numbness or a bit of weakness. You have to have quite significant pain to justify surgery. The other is that there is a situation where you can actually have a burned nerve. So actually, you can have nerve that is unremitting and is really severe and yet, the appearances on the scan don't suggest a huge disc hernia. Maybe a little bulge or some of that and that's actually often a chemical irritation. Something's happened to that nerve, it's become internally scarred. So 95% of people who have surgery for disc herniation and nerve compression will do well, 5% won't do well for a variety of reasons. They're the numbers and it's pretty good but you know what? Who left that soft disc? And if you could manage the pain and if you travel 52 weeks down the line, you'd also have 95% of people having a satisfactory resolution. Difference is that they've had to put up with the pain longer. They've had to take medication or have injections and they haven't had the complications to surgery.

APM: How long typically are you thinking here?

NB: Most people actually would go for six weeks. If you go for six weeks and you've still got really severe pain then you basically talk it through the

patient, “This is the option in terms of surgery. This is what happens if you don’t have surgery. These are the risks. These are the complications,” etcetera. “If you have surgery then you have to accept there are complications. If you don’t have surgery then you have to accept you’re going to be living with pain. You may need to have some injection treatments to dampen down the inflammation. You may be on gabapentin or pregabalin or whatever those other fairly powerful neuropathic painkillers for quite some months whilst you’re dealing with it,” but taking your point and turning around, there’s a lot of people, when confronted by the idea of having operation, say, “Is there anything I can do short of that? Please do not think about operating on me because I just do not want it. I’m so scared. I don’t want to do that. It’s right next to my spinal cord. I’m worried about being paralyzed. Aunty Ethel had an operation on the spine. She was on a wheelchair ever after,” etcetera and, you know, most folk don’t actually really recognize the difference between an operation here from down there, one on a nerve root, one on your spinal cord. So it can be a frightening thing.

APM: You talked about complications. What is the incidence of adverse events for this sort of surgery? It’s quite favorable now, I would have thought.

NB: So in the hands of a good surgeon, a well trained surgeon who’s doing the right operation for the right reason and doing it well which most surgeons are…there are a few mavericks out there but most surgeons do it pretty well. The risk of a single nerve root being injured is about 1% but of that 1%, the majority will actually get better. They’ll have a bit of bruising and they’ll get better. Now the one level where that might not be the case is at C4-5. It’s the C5 nerve root. It’s right in the middle of the cervical lordosis and it’s the nerve root that’s most under tension. So if you take some pressure off it, what can happen, it can bowstring backwards, particularly with a posterior approach and then you can get a C5 palsy and that is often irreversible and that actually is the…if you like the bogeyman or cervical surgery but in general terms, about 1% is the average neurological injury rate for a single nerve and if you say that of those, maybe 1 in 5 will be permanent and 4 in 5 will be temporary. That’s about right. What’s the risk of paralysis? Because that’s what’s really important. In the cervical spine, paralysis is a risk, particularly if you’re putting something to the front of the neck. So bear in mind, there are approaches from the back, there are approaches from the front. If you take the disc out of the front and you put in some sort of device either to fuse it up or to use a disc replacement…so a moving part essentially, so something that mimics the movement of the spine, two metal plates or a bit of plastic in between them or something along those lines, a bit like a joint replacement in a hip or a knee. The chance of something going backwards into the spinal cord and causing paralysis should be no higher than about 1 in 2,000. So in any one surgeon’s career, it shouldn’t happen but it does happen. There was that famous case of Sidaway versus the Maudsley Hospital which formed one of the keystones of medico-legal practice about consent and that was, you know, if you have a complication that’s got a risk

of less than 1 in 1000 should you tell the patient. Well, that was a case that said yes, if it's such a catastrophic complication, that actually it's going to have a, you know, long term damage. So neurological complications are rare but they are catastrophic and patients need to understand that but not to the extent that they get frightened if they need to have something done.

APM: Interesting. That does reflect what we do in physical therapy in terms of warning people about the possible complications of cervical manipulation which is, of course, the only area really where we're going to do any serious damage unless we're very, very careless and there's always a debate. If you warn people about it then people will be worried and they'll say no or they'll tense up and it'll be more difficult to do that sort of procedure but at the same time…I mean you just put it very clearly there, those consequences are potentially catastrophic however rare it might be and as far as I'm aware, I don't think it's ever happened in an osteopathic treatment, anyone who suffered complications from —

NB: I think it's been described with chiropractic manipulation and there was perhaps a very famous case where Simon Singh wrote about it in the Guardian.

APM: We do all love Simon Singh.

NB: And then the College of Chiropractic down in Bournemouth and the associated chiropractor sued him unsuccessfully.

APM: Well, successfully at first —

NB: Successfully then later unsuccessful on appeal. The end result was unsuccessful, as you know but the…what you can't away from, in fact, is that if you manipulate somebody at the C1-2 junction and if they have got…established degenerative changes and if the vertebral artery, taking it to 90^{o} bends, up into the skull gets caught on an osteophyte, something might happen. That's true enough. Question is how do you mitigate against that? Well, one is actually to warn the patients and now, of course, we've got Montgomery which was that Supreme Court case in 2015 which basically says that you as a treating clinician have to then tell the patient what it is that they need to know and that, of course, actually adds a level of complacency which is quite difficult because we actually need to judge that for our patients. So you might actually have somebody come along and say, "Listen. Don't worry about what it is. Just get on with it. I'm in so much pain. I don't mind. I accept there are complications," you know, "OK, that's the world. That's life." There are other people who want to go through every single risk and then, you know, "I'll think about it and I'll come back on Wednesday..."

APM: Is it Montgomery as well, that particular case, where it came out that your practice had to appear reasonable in the eyes of other patients, not in the

eyes of practitioners. So there had to be a lay person who thought this was a reasonable way to approach the patient.

NB: Absolutely and of course, that's the reverse of Bolam principle. So the Bolam principle was that if you, as a medical practitioner, could then get three people, three wise men to support you, that was fine. That's good enough but actually, in the Montgomery case, reversed that and said actually, it's got nothing to do with the doctors here. This is all about patient. You're absolutely right and if patients don't perceive this to be a reasonable option and if they haven't been given enough information to make that judgment then actually, what you're doing is not acting with consent and that was the key to it because actually, the gynecologist involved in that case made a judgment that the patient, Montgomery herself, didn't need to know. Well, of course, she did need to know. So that was…this is exactly the same with what you can I do and that is that, you know, if we are recommending treatment, patients need to know what it is that they're actually going to undergo.

APM: Interesting, of course, to reflect on whether had she known, either her answer or the outcome would've been different but maybe we're getting off the point.

NB: Well, no, I think actually, that goes back to the Sachar which was that seminal case on consent again that came in the early 2000 and that was a case where a neurosurgeon operated on patient and caused a cauda equina syndrome. Now, the key there was that he didn't warn her of that potentially catastrophic complication even though it's very rare. He precipitously operated on her. He saw her on a Wednesday and operated on a Friday. He said. Here you are, you've been running around Harley Street for two years, trying to get rid of your pain. I know what's going on. I've got a slot available on Friday. Come and have it done." And because he didn't warn her of the complication, she had it on a Friday and then she actually got it. What she argued and her team argued in court was that had she known of that complication, she wouldn't have…either she wouldn't have had the operation or she'd had it done another time and therefore the risk might be different. And that was held up in the majority laws, it was a 3-2 verdict on her behalf after appeal. So I think with whatever we do, that Sachar case and then Montgomery really has actually made, you know, the case that we have to listen to what patients want and we have to give them the information that, you know, is suitable for them and that's one of the things I've tried to do with the backdoor website and that is to give people, you know, focused information, sure but also lots of ways to go find out more about it so that if they are a self-directed learner, they can do that. They can come back and ask the right questions and actually, this lady is a good example of that. She's actually asking the right questions because she's been given an option which in the eyes of the surgeon makes sense but it makes no sense to her at all. It actually made no sense to me either and the advice I gave her was, you

know, go off and do a structural rehabilitation program to begin with. Get your lumbar spine sorted out first because you've got a couple of discs there that, you know, one of which we haven't…can we move on to the next MRI? And you see, the lumbar spine here…if you look at that, that bottom disc, the L5-S1 disc, that's really narrow. It's, again, degenerate. It's long-standing degeneration. It's actually probably very stiff. The L4-5 level above is only minimally dark and the rest of the spine looks OK. Sure, up here at the thoracolumbar junction, there's an area of inflammation but that's not where her pain is. So if that is actually where the majority of her pain is, it's the base of the pyramid, get that sorted out and then hopefully, the rest of it falls into place. So what she really wanted was logical advice, breaking things down rather than sort of the 'gobbledygook' she got. And so there we are. What's happened to her? I don't know.

APM: So you don't know whether she went for any of those surgery options.

NB: No. So this was by nature. This is a second opinion that I've done. Suddenly comes to see me, asks for an opinion and they go away again and usually, I don't ever see them again. So I never found out what happened. I do occasionally. Not very often.

APM: Just taking you back earlier on, you said that the majority of these complications I think…did you say majority or genetic?

NB: So the majority of people who have…well, no. The reasons to have degenerative discs is 70% inherited and 30% is environmental.

APM: So is it —

NB: So if you're a coal miner, you could be down in the coal mines all your life and never get back pain because of you being gifted a good set of discs by your parents or you'll last for six months and then you're crippled because actually, you had a rum set of discs.

APM: Is there a racial component in that? Is it greater in, say, Asian patients than in Caucasian?

NB: No. It's probably greatest in Caucasians and of those, actually, it's probably greatest in Nordics. So that means that, you know, people in the northern part of Europe will actually get it. We know that in Southern Europe, they have a different pattern and so there's a combination there of both the genetics and also then the environment because obviously, their diet is somewhat different. They take a siesta. They rest in the middle of the day so they take pressure off their disc but in reality, majority of it is genetic. In terms of Asian populations…because you have to separate those out into the south Asian population and also then those sort of the Pacific Rim population. They're quite different and we know that there are very different

diseases, for instance, the far eastern population get. So they get much more ossification of the posterior longitudinal ligament. They get degenerative change but in the neck, the myelopathy comes about from a different mechanism from what we get in the west. We get degenerate disc in the west, they get what's called OPLL which is ossification of posterior longitudinal ligament they get this sweeping bow-…. It's a bit like Ankylosing Spondylitis but in an older Japanese person. So it's not the same but it's the same effect and that is they get a stenotic canal and they get a rigid spine and of course then, they get myelopathy.

APM: So what you've said there, I mean it's a very useful question then presumably to ask whether your parents or siblings have had disc problems.

NB: Yeah. So actually —

APM: I've always thought that that was almost pointless but now it would seem it is —

NB: What you'll frequently find is that if you actually ask the patient, they might or might not know. You do need to find out whether they know their parents or not because quite a lot of people are adopted or IVF or whatever else. So if they do know their parents and if they know their history then that's fine but I see quite a lot of people who either they don't know and you can't work it out or actually, their partner will say, "Well, your dad had a bad back." "Oh, yeah, he did. Yeah, I remember now. Yeah, he had a bad back." So actually, the partners often remember because they first met the partner's parents when they were young and first impressions count. So if, you know, Uncle Ron or so, you know, "My father-in-law, Ron, was always laid out with a bad back," you remember that, whereas you might not remember your dad being, you know, different.

APM: Well, you've got some other studies in, haven't you? So we might —

NB: Let's move on. So what we can do —

APM: We should say to the audience, while we're doing this, I mean please do feed in your comments on this, on any similarities you've seen in your own clinic, any complications which maybe we haven't discussed yet that you'd like ironed out. We really value your feedback on that.

NB: Let's move on to this case. So what we're going to do is if you shift on…not that one. Let's just make sure. It's 61279. That's the one. Yeah, that's the gent. So this is an interesting case, 48-year-old male journalist from Denmark who actually was working in China when this happened. What he developed was significant back pain and leg pain, was really, really sore and he went to see a Chinese doctor who organized his MRI scans and we'll tak through these in a second and the Chinese doctor said, "Well, look, I can give you an

injection and that will help your pain." He forgot to tell the patient that the injection would only last for a short period of time, a few weeks. So that was an error. So that's another aspect to this and that is managing expectation. What is it the patient is going to expect out of treatment? So presenting with back pain, had leg pain in a sciatic distribution but he didn't have any neurological deficit, he had an injection, he had a transforaminal epidural. So basically, a needle to the outside of the foramen inject some dye, make sure in the right place and then put some local anaesthetic and cortisone in there. Worked a treat! So the guy goes back to Denmark on his summer holidays and he's absolutely fine. He's then relocating to Croatia, being a journalist and peripatetic, etcetera, gets into the Dalmatian Coast and bang, his pain comes back again. He's not impressed because the Chinese doctor didn't actually tell him but by nature, drugs wear off and even long acting drugs wear off. So what you have to tell people with these sorts of injections is actually, that the maximal effect can only be, in reality, as long as the drug is in the system which is 6 or 8 weeks and after that then there's a chance that the pain might come back. So he's come back now and the question is what do we do about it? So what we've got here is, on the left, a T2 sagittal lumbar spine view and what you can see is that at L4-5 and at L5-S1, there is darkness within the disc compared to the discs above which are normal. There are modest bulges pushing back into the spinal canal. What I can tell you is that at the…if you go off the midline a bit, there's a bit more bulging at L4-5 on the left side than there is on the right side which is why he's got left sided pain. So it's basically picking up that nerve root as it comes out of L4-5 but what's interesting is if you look at this axial view, the first thing you see is that he's got fantastic paraspinal muscles. His longissimus and his multifidus muscles are really, really good. If you made that deep red and you took that from a sheep, that would be a Barnsley chop. So that'd be a nice Barnsley Chop which is fine. So what we want is good muscles. What you don't want to see is a lot of this light grey stuff stuck in there in the muscles there because that's actually fatty replacement. So if you've got a bad back that goes on and you just can't use your back, basically, your muscles will waste away and then you get fatty replacement. That makes life difficult for rehabilitation. But anyway, so what he's got here, well, it's difficult to see potentially but actually, there is a little area here where there's a little spec of bright signal on the back of that disc.

APM: Right in the middle of the MRI —

NB: Indeed, pointing slightly to the left and don't forget, we're looking at towards the head on all axial scans. By convention, we're looking at towards the head. So this is left side and that's right side and it's pointing to the left and what that is is an annular tear and an annular tear is a rent in the outer part of the annular. So it communicates between the nucleus and then the spinal canal through which you can get leakage of nucleic content. Now, the fluid within your disc, as it just starts to degenerate, is made up of a huge number of really unpleasant substances. So there is phospholipase A2 which is a really

nasty enzyme that produces pain and you stick that on a nerve and it burns it effectively. There are matrix metalloproteinases which are also really quite toxic and when that stuff leaks out and it gets on to a nerve root, it produces inflammation of the nerve root. So you get radicular pain and when you have an injection of a cortisone then, of course, that nullifies that. Pain disappears for a period and if the cortisone is long acting, it sticks around. Then it keeps on working until it's then absorbed and then it goes away again which is why this chap's pain has come back again. So the question is how do you treat it? Because if he's actually got pain that is coming from a leaky disc, what's the treatment? It turns out that his pain only happens when he's upright and putting pressure through his back. So it's compression of the disc that causes the problem. Now, if you can then decompress the disc by reversing gravity, what you can do, of course, is you can alter that process and we know that there are people who have discs like this that respond to inversion treatment. An inversion treatment, essentially, reverses gravity and takes pressure off the nerve and stops the leaky chemicals coming out of the disc, stops the irritation and it can be highly effective. When I first came across it 15 years ago I suppose and one of my patients had come along and said, "What do you think of this?" and I said, "I don't know because I don't know anything about it." He said, "Well, I use it and this is why I started using it because I had back pain. I had some leg pain and it was recommended to me and what I do is I do five minutes morning, evening and that's fine and it keeps me in good shape and that's no problem at all. My pain goes away," and he actually came up with a different problem. And since that time, what I'd been looking for are basically patients who have got dics that will respond respond to pressure changes to gravity and quite frequently, you see people who…they get pain when they sit, when they stand and they'll stand to begin with but after few minutes, they start to get compression to their disc and they start to get symptoms and in those patients, about 50% will respond to inversion treatment and all you're doing is basically, you're sucking that disc back in by going inverted and then take the pressure off and that could work quite well.

APM: We'll look at that in a minute a little bit more closely but we just had some questions come in. The first one harks back to what we were saying moments ago and that is, "Do many of your patients decide not to have surgery after your warnings?"

NB: If they've got a problem that is…he's got a natural history that is benign and I tell them, "Look, if you have an operation, it'll do this which is 95% chance your leg pain will disappear." So for instance, a slip disc in the lumbar spine, do a discectomy, a micro discectomy. They've got a 95% chance of having really good result but there's a 1% to 2% risk of complications. If you wait and we can manage it, if in a few weeks, you begin to get better, actually, the likely it is you'll make a complete recovery. If you can get them on that level where they can start to weigh up the options, the majority will say, "I don't want surgery," and it's not the warning of the complications that actually

puts them off. It's the benefit of the non-operative side of things. It's the interruption of their life. It's the fact they can't work. There's a period of time to recover, etcetera. So it's a bit more complicated than just the fact that I've given them some nasty warnings about any dire complications. It's all about, you know, can they carry on doing what they need to do and quite often, it's, you know…this time of year particularly, that sciatica in July is bad news because everyone's going on a holiday. What they don't want to do is go and have an operation. So the answer is some do but the majority don't. The majority, actually, they…when you talk to them and actually give them the right information, they'll see the logic in a less invasive pattern of treatment to begin with and then you give them a cut off and then say, "Look, here's the line in the sand, if at, say, three months after your onset of sciatica, you continue to have pain, it's not getting better, in reality, at that time, you probably need to have an operation."

APM: I think a lot of us are concerned maybe more so in those areas where we've got a less wealthy demographic, that in that period when you're not having surgery, generally, you're going to be doing some sort of rehabilitation therapy, physical therapy and that being the case, it's going to incur an expense for the patient. Now, I presume that most of your patients, when you were doing surgery and even now are covered by medical insurance, are they? Which I —

NB: Yeah. So about ⅔ medical insurance, ⅓ are self-paying. I think the real problem is actually not that group at all because I know it only really covers about 10% of the demographic as we talked about. What we're really interested in is the 90% of people who don't have that, who have to go through the NHS system. The big difficulty is that trying to separate out those people who can respond to treatment and those who can't. In the present turmoil that is the NHS is really quite difficult and I think GPs are struggling with this and one of the things I do is…I sit on the United Kingdom Spine Societies Board and that's the overarching board for the Spine Societies in the UK and we're linking with NHS England and with all of the major organizations that plan spinal care and as of this spring, we've just introduced the Improving Spinal Care Project which is designed to start to bring some sense and some sanity into management of these sorts of problems and it plays on NICE in 2009 tried to do and what they're trying to revamp in their 2016 guidance and actually, it's one of our colleagues, Steve Vogel's on that panel and has a big osteopathic input to it and it's important because what we need is some logic and what we need to know is that if somebody's got a problem that's going to get better by itself, can we manage it sensibly and effectively without any intervention, that's absolutely fine. What we don't want to do is to park somebody who's got a really nasty pain problem and say, "Go and lie down for six weeks," because we know that's bad. We don't want to say to them, "Here's a sick note for six weeks. You're going to do nothing," because that's bad as well. So we need a bit logic in this and a bit of sense. So that group of people which is 90%, I think that's really important.

The 10% that I see, actually, is much easier because we can get them very early physiotherapy, osteopathy, whatever it is they need. We can get them injection treatments very quickly and if needed, we can give them timely surgery if they haven't got better any other way. So actually, that's less of the issue.

APM: So actually, one of the things that we need to address really is the time from presentation to actually getting something done about this.

NB: Yeah, that lag time and of course it is not helped by the fact that the NHS is now governed by targets whereby if you go and have treatment then you will have treatment at 18 weeks after referral irrespective of the urgency of your problem. So that's a serious issue.

APM: Now, one of the advantages of the system we've got here is that all our questions are anonymous. So one of them has admitted to not being able to follow what you were discussing on the MRI. So we'll give you a pointer. Now, if we keep the camera on Nick in the screen, could you run through what you were saying about the transverse section earlier on and the areas that you were pointing out?

NB: So if we're looking at an axial view, the first thing to remember is we're looking up towards the head. So this is the left and that's the right and if someone's got left sided leg pain, you're looking for something that's happening in this area here, not in that area there. This is the skin and the tummy's over there. These are the bowels. There are the major blood vessels in front of the spine. This is the psoas muscle here.

APM: It's quite the size, isn't it?

NB: Yeah and in cyclists, it could be this size and a sprint cyclist's is huge because —

APM: I remember once before you were showing some MRIs I think at the Chris Moody Centre and there was some people where there was a drastic difference in the size of psoas which you said was diagnostically important.

NB: It can be and certainly, you can get people…well, I mean there are two things there, one of which is if you get a footballer, he's going to have different size psoases because they're always right or left footed as opposed to both footed and they will have a bigger psoas on the side of their footedness. So a right footed footballer will have a psoas this size and not this one, this size here because they kick it more, because it's their hip flexion and that's what they have to do but if you actually have a pathology in this area, particularly the upper lumbar nerve roots then you may well have a lack of psoas bulk and that could be really quite impressive. So what we're looking at here, that's the disc itself and what you see here…this is a cross-section through

the middle of the disc here. You can't really see a differentiation between the outer part of the disc which is the annulus and the central part which is the nucleus. You can see some lightness there but what you should see is a really distinct brightness here. If you imagine, take a slice through that disc there, what you'd see is a rim of dark on the outside and a very clear bright section on the inside because the nucleus is 70% water. So in this scan, water is bright, so it's going to shine up as bright. The bit that's of interest is really…is that little tiny dot of stuff there. What that represent…and I know that because obviously, I've got my other scans and I could've put up all the other scans but then you didn't really want to see 80 pictures of this, you know, because that would be even more confusing but what I know is that that represent a communication between the inside of the disc here, the nucleus and there's a crack or a crevice out through the layers of the annulus, the 15-20 laminates of annulus and it comes out and exits just here and that's right next to the transiting nerve root there. That's the L5 nerve root —

APM: Well, that clue is a very tiny bright dot there, isn't it?

NB: It's bigger on one of the other scans. So it's fine but that's…so I know. So that's what I'm talking about. So the annulus, the annular tear…and you can't see it on that one there. The annular tear usually shines up as what's called a high intensity zone at the back of the disc and some of them, they can be really quite circumferential. They can go right around and you get all sorts of disruptions to the annulus. What they represent is an intermediate stage of disc degeneration and the relevance of them is only of importance when you've got someone who's got radicular pain and they don't have a bulging disc. They don't have a compression of the disc. So if you've got a big bulge pushing on to your L5 nerve root and you get pain going down your leg, the reason why you've got that is twofold, one of which is the nerve root is tethered. So it physically can't move. So given that the nerve is attached to your brain and your big toe, every time you move something, if it's tethered, you're pulling on it and that hurts. So one nerve root pain is tethering pain and the second, of course, is the disc bulge has come out and actually, it's very inflammatory because that nucleic material sets off a really inflammatory reaction. Within these cases whereby there isn't a big disc bulge and you're looking for a reason why somebody's got radicular pain then you got to think, "Well, could there be something else?" and frequently, the radiologist won't call this. They'll just ignore it because they think it's coincidental but actually, if you've got someone who's not got a big disc bulge and any other reason for nerve root pain and they have an obvious annular tear then what you can do is say, "OK, well, that's not quite diagnostic," but stick an injection in there, take the pain away and hey, suddenly you got it because actually, what you know is that the annular tear is leaking this horrible chemical soup out of the nucleus, around the nerve root and causing the pain. So it's chemical pain.

APM: How long is that leakage likely to go on for?

NB: Well, it depends on what you do. So if you actually treat the disc and then…say for instance, you do your injection and then they do physiotherapy and they do lots and lots of core stuff, so they've got really good core, big improvement in their abdominal tone, suddenly the pressure's lifted off the spine. So you're taking away gravity and then the tear can start to heal up because actually, that pressure's taken off and the laminae can go back together again so it could start to heal. So actually, it can be quite a short period of time if you give them the right treatment, so anti-gravity treatment. If, however, you don't do that, it can go on for years, so until…actually, what often happens with annular tear is if you look at them sequentially, and I've seen a few patients over the years, a number of them will suddenly herniate. So actually, what that crevice is is an area where a fragment of the disc and suddenly come out and bang, it goes through and then it present with really acute sciatica. So they've had annular tear and then the next scan they've had a year later is big disc herniation and then it's this obvious and actually, with those of course… because majority of those will get better by themselves and they don't need surgery. That's actually fine because as I said it's a healing event because once the disc is actually then resolved then it gets scarred up and the whole thing sorts itself out.

APM: And the material that gets extruded will dissolve, will disappear.

NB: In the majority of cases. So in majority of nucleic material that comes out is well hydrated, so one it shrinks So the tethering process then reduces quite quickly and usually, within the first six weeks, you've got a 50% or 60% improvement in your sciatica symptoms. In the first six weeks, you can be pretty sure that you're going to be much better by the time you get to three months after the onset and actually, there are people who get better which is fine. So the dehydration helps it but also, of course, the discs don't have blood supply to them after the age of 13 or 14. So what goes on inside the disc is not then exposed to the immune system. So when the disc material comes out, it sets off this intense immune reaction. So there's this huge inflammatory reaction around it. Once the immune cells get in there, little macrophages get in and they start to chew it away, it disappears and if you look at discs sequentially over six months and then a year and then two years, even the biggest disc herniations can completely resolve by themselves without any intervention at all and that's why the natural history is so benign for simple discs. However, just to create a little bit of controversy, when we look at this…I don't know. You probably can't actually see it on here but actually, this has been going for a long time because there's a little rim of bone here and the problem with that is that if you've got, say for instance, a disc that is bulged out but has begun to throw up a little osteophyte, that osteophyte can't resorb. So if that's contributing to the neural irritation then it doesn't matter what the rest of the disc is doing, that osteophyte will stay there and the nerve will have to be…have to get around it. In the neck, it's actually much more important than in the lumbar spine

and osteophytes around the uncovertebral joints that go into mains, they feed into the foramen. They frequently will be the cause of cervical brachialgia. So if you can see on the MRI scan a hard bit of something pushing against the nerve, that's less likely to have a benign outcome than a soft…nice, big soft disc herniation.

APM: Let's talk for a minute about inversion therapy. It would seem like a good idea and I've known people many years ago who would have a set of inversion boots which they would strap on and hang from a bar in a doorframe or whereabouts. Things have progressed a bit since then but what's the evidence behind it?

NB: So there are no Random Controlled Trials. So no level 1 or level 2 evidence. There's quite a bit of level 3 evidence out there and that's kind of the best you can get and the reason for that, of course, is that nobody's actually done the trial because they can't actually stratify patients with back pain well enough because they haven't got the right tests. But the level three evidence suggest that patients who have got a disc that has got some loss of its internal hydration, therefore it is collapsable it's not got that nice sponginess there and who've got reproducible back pain, when you load the disc, they can then, in certain circumstances, benefit from inversion therapy and I will say to people, "Look, it looks on the MRI scan and it looks from your history that you might get some benefit from this. Try it out because I reckon actually, there's about 60%, maybe 70% chance that you'll be able to benefit from this." The patients who can benefit most actually, a bit like this one here, is when you've got leg pain that comes about through some sort of stenosis in the foramen and you could stretch the foramen out and take some of the irritation off the nerve root. They are a subset that do better and there is some evidence with that. So the evidence is not overwhelming. There's no doubt about that. We don't go out and recommend somebody goes and buy the £900 Teeter table willy-nilly, try it for a few times and then think, "Well, this doesn't work," and stick it in the garage, put that away. It's a waste of money. What I usually recommend is that if you can find someone you can borrow a table from, if you've got the right set of clinical and radiological circumstances, go and try it, see if it's right for you. If it's right for you then that's fine. So yesterday, for instance, I saw a chap who I operated on 4 or 5 years ago. He'd had a disc operation, L5-S1 in the 1970's, 1980's. That level completely fused up by itself and the level above had undergone degeneration and that was then stenotic and thus he had a lot of instability. So I decompressed it and fused it and that worked very well and then of course, his levels above had deteriorated and he's got a little tiny curve in his spine. What he was getting was right leg pain when walking. Problem is he's a retired businessman who now spends all of his time, and his wife, walking every single day. So they spend their time halfway between Northamptonshire and the North York Moors and they want to do 9, 10, 12 miles a day and they don't want to be stopping because he's got leg pain. So what we did was to give him some advice regarding walking about breaking

up but also, I said, “Look, try a Teeter table,” because he actually had foraminal stenosis that was causing it. He came back to me yesterday, six months down the line and he said, “I’m back to walking 9 miles a day with one go. I’ve got no pain at all. It’s brilliant. The Teeter table works real well. I use it five minutes in the morning, five minutes lunch time, five minutes in the evening,” and that’s absolutely fine. So that’s the good news story. And then, of course, you get the bad news stories where people will say, “Well, I’ve tried it and it made no difference and now I’m lumbered with this bit of metal because I can’t get rid of it on eBay,” but, you know…so —

APM: Well, you mentioned Teeter tables which of course is a brand name for an inversion table and we’ve got a Teeter table. So let’s have a look at that. We need to push your chair out of the way and we need to move this thing on to its mark and just wiggle your side around slightly on to that red mark. So we’ll look at this table overall. I’ll get around this side so the camera gets a good view of this. Obviously, we’ve got clamps here to hold the feet. Are we able to get a different camera on this to get the feet image in? So we’ve got clamps to hold the feet. We’ve also got an element of control over the length of the device which presumably controls the balance.

NB: Yeah. So that’s actually really important and that is that you have to set the length of it because it’s a Teeter table. It’s absolute balance. So if you get the length wrong, you cannot then self-invert and then come back up again. You get stuck inverted which is no good.

APM: And I notice it’s a very smart looking table, isn’t it? Just team, let me know, do I need to remove this table so that you can see it properly or not? We’re OK, good. This one will collapse in half, so presumably you can stow nice and smooth up against the wall. It’s got a lovely plastic bag here. So I wonder…there is, of course, a strap on there of adjustable length which will alter the inversion extent here. So if you ever get somebody into some of these things, what are the contraindications?

NB: So the contraindications are anybody who’s got significant eye problems, so glaucoma or anything that then responds to increasing eye pressure. Somebody with macular degeneration don’t like it. High blood pressure and generally, cardiovascular imbalances are a contraindication to it. Certainly, someone who’s had a previous stroke or other cardiovascular sort of catastrophe. Those people, we’d get rid of those. They’re not allowed on it.

APM: I assume one of the contraindications is probably wearing a microphone in your side pocket but I’m going to try that anyway.

NB: Well, it might be because your little black thing might come out and sort of, you know, whack something.

APM: So I'm going to wedge myself into the ankle grips here and there's a little piston control to get those to control down.

NB: All nice and secure.

APM: So what I've got to do now is push myself backwards.

NB: So what I do always with people is I keep my hand here to begin with, the first time around and say put your head back and hold on tight on to these sidebars and then just let yourself go. And then if you let your arms just drift backwards on those sidebars, no...-

APM: Ah okay...-

NB: Now push yourself back a little bit. So that's fine. So now, you come to the horizontal.

APM: It's quite hard to tell on these things what angle you're at, isn't it?

NB: So with your right arm, now put your right arm just directly upwards, slowly and then just put it up above your head and you should go down and then the left arm release a bit. There you go and down you go and now put your left arm up a little bit and, you know, not quite...-

APM: I'll give it another go.

NB: Yeah, that's fine. So we'll keep you up and in general terms, what I try to do is, in my clinic, if somebody comes in and they've got pain then I'll get them like this and make sure they're comfortable, not getting a headache or any visual symptoms and sit them there just a couple of minutes and what you can do is if somebody's got back pain and leg pain, particularly, within a couple of minutes, that'll change. It doesn't necessarily take it all away but it changes and if you can do that then you could say, "OK. Well, you look like you're a candidate."

APM: What sort of angle do you start them off on? And I confess, my head feels that it's going to explode —

NB: So I start them here, about 30^{o}, OK? And then the tether strap under there, I always have set so it goes down to 30^{o}. You can get right down. You can right up like that and actually, some people really like to go inverted at sort of 75^{o} or 80^{o}.

APM: And the people get more used to the inversion as they do this more often?

NB: Yeah, in general terms, they do and they're happy that they experiment and of course, what you can do is when you're inverted, you can actually then

start to do core exercise on this in the inverted position and there's a lot of stuff on the Internet, on YouTube where you could see the exercise of people that actually do that.

APM: Well, we'll put some links up to that if people haven't found it themselves. Thank you.

NB: And so, you're stuck in here —

APM: I'm stuck —

NB: Yeah, I've got no idea how to do this. There we are. It's different from mine so it's —

APM: Well, it's the same company I think, isn't it?

NB: I've got an old version which is much simpler.

APM: So I have no idea how much these cost. We will put a link up on the website to this but this is…if you Google Teeter tables, you will come up with a company in Peterborough who have very kindly loaned us this table for the evening. As you can see, it's a very well made device but as they say, there are other devices that are of similar available.

NB: I mean it's interesting because if you just put it into a search "Teeter tables", you'll come up with something that is as cheap as £50 I think is the cheapest one we ever found. There's one that, you know…you get on Amazon for instance that…thanks very much. That's…

APM: Hot isn't it...

NB: Yeah… —

APM: I do know the gins and tonics are going down well in the audience.

NB: Thank you very much. So yeah, Amazon sell one £80-90. This, the one I've got is a previous model. It's £400 and you can get then going up to £900 depending on whether you want bells and whistles and bits and pieces. So it's a huge range and I think if people are going to have a look at it, it's a mechanism of treatment. One thing they can do is if they've got their local therapist and the therapist has got one in their practice then they can go and then actually try it on a few occasions and see whether it works and that's quite a good way of doing it. If it does work then they can get their own and I usually say to people, "Look, if you're going to experiment, buy a cheap one. See how you get on and actually, once you've done that then, you know…if you like it and it works for you, get a more robust one."

APM: But your walking patient, the fella who went walking with his wife, he was doing 5 minutes, 3 times a day. Well, you can't do that with your therapist because they won't let you come in 3 times a day for 5 minutes on the inversion table. So what's a reasonable test on whether it's going to work do you think?

NB: Ten minutes to begin with. If you go to your therapist and then you do a session, you do a 10-minute session and you find there's a significant alteration in your pain and that that then goes on for a few hours afterwards, that I think is a fair test and you can say, "OK, this is going to work for me, at least, you know, in the short term. That's fine. It's worthwhile investing £50 or £70 in it to see whether it's going to last in the long term," and then that's fine. The big problem, of course, is what you do when you go away on a holiday.

APM: Lie down.

NB: Well, that's when you need your hang up boots, isn't it?

APM: Yeah, I suppose so. When you mentioned contraindications, you mentioned heart abnormalities. Does that include hypertension?

NB: Yeah. By and large, most people with uncontrolled hypertension should not be going inverted and if you've got well controlled hypertension then it's something to be considered but it's a soft contraindication if you've got hypertension but most people have, you know…if they're over 50, they could have a slightly high blood pressure. It doesn't...-

APM: Well, I'm conscious. I mean we're well into our session. We've got five…in fact, we've got seven case histories we could go through and we've only done two but there are more questions. First of all, someone has asked, "Could you just quickly explain the difference between various operations, decompression, fusion and so on?"

NB: So if you have a…let's just use this. If you have a nerve root…so for instance, this L5 nerve root here, if that nerve root is compressed, there are two fundamental reasons why it's compressed. One is because you've got a bit of disc bulge pushing backwards and pushing into it and the other is because the facet joint has become arthritic and has got osteophytes on it. It's pushing forwards. So they're basically the two mechanisms. Obviously, there are other more severe spinal pathologies that can produce nerve root compression but in the degenerate sense, that's mostly what they are. So therefore, if you haven't got much of a disc bulge but you've got a big arthritic facet joint, what you want to do is take pressure off the nerve, i.e., a decompression. So what you do is to effectively nibble away the extra bit of bone that's pushing in there and free the nerve up and that's the decompression. If you've got a normal facet joint which you've got a disc

that's bulging backwards because there's a fragment of the disc that's come out of the nucleus and has then migrated into the spinal canal and if you'd operate on that, you're going to do a discectomy because actually, just…it's really a partial discectomy. Of course, nowadays, it's prefaced by micro because it's done through tiny little holes with microscopes and in those circumstances, what you're going to do is you've got to open the spinal canal just by making a little window through the ligamentum flavum, probably not take you much in the way of bone off the side, if any. Move the nerve gently to one side, so you move the nerve medially to here and we have to imagine this piece of disc there and literally, you make a little incision over the back of the residual part of the annulus and this big bit of disc comes out. It looks like crab meat when it comes out and you pull it out and, you know, it's a very satisfying operation to do and and suddenly the nerve is —

APM: For you or the patient?

NB: No, for the surgeon because when you do it, you've got this great big lump of disc and the patients usually come in with really quite nasty sciatica, great big lump of disc. You see the nerve, it's tight before you do it then you take this lump out, the nerve's completely free. They wake up and on waking…having had sciatica for however long they've had it, suddenly they wake up, the pain's gone and they usually wake up with a huge smile on their face and then you have analgesia post-operatively because the pain has just disappeared which is fantastic. So that's —

APM: No analgesia for the operation either —

NB: No analgesia, no. A bit of paracetamol for a bit of muscular pain, that's about it. So actually, that's one of the most satisfying spinal operations you can do both for the surgeon and for the patient —

APM: And I suppose, actually, rather than going to great length about this, we should actually say to people if you just look at the other interview that we've done with Nick, we've got some interestingly graphic videos of spinal surgery and a much greater in depth explanation of what all those entail.

NB: And then the other bit of which is what's a spinal fusion, well, a spinal fusion is essentially a mechanism to take away movement from the spine. So this goes back to the good old days with orthopedics where if you had a joint that was painful because it was arthritic, if you stopped it moving, the pain disappear. Go back to 1930's, 1940's, the Girdlestone operation was the only operation they had for hip arthritis, basically take away what…the Girdlestone operation was taking away the joint completely and just leave sort of a residual fibrous mass and that stopped that movement, that took the pain away or you did what's called an arthrodesis which is fusion and the hip will fuse together and you'll still see people who are walking around with this great big pelvic tilt gait because they've actually had a fused hip to treat

arthritis. Probably nowadays, there will be 1 or 2 running around…well, not running around but still there from the 1950's and 1960's. Hip replacement only really started to become popular in the late '60s, early '70s. So it's relatively recent, sort of 50 years. So the idea is that if you've got a painful joint and you stop the joint moving then you take the pain away which is a nice, simple one to one relationship, if only that were the case. Anyway, let's assume that is the case and on this occasion, if we assume that one or both of these discs has been proven by whatever mechanism that it is moving and it is painful, if you fix it and stop it moving then you can take away the pain and to do that, what you usually do is to put screws and rods into the spine, screws from the back to the front, through pedicles which are those little round bars of bone linking the back of the spine to the front and then link it together with some rods back here. And the key to that then is to create a fracture in the spine. So what you do is you take the surface of the bone off, at the back between the two vertebrae and by doing that then the body reckons it's got a fracture. Well, bone heals itself by making bone. So what it does is throws up lots of bones but if you put in bone grafts, so you've harvested that from the back of the pelvis, then that will get incorporated and then suddenly, you get strut of bone. So the metal work is there as a temporary fix and the real key to that operation is the biological fix which is the bone graft into that artificially injured spine and that's a spinal fusion and there are lots of different ways to do a spinal fusion. You can go from the back. You can go from the side. You can go from the front. You can go all sorts of ways and bits and pieces but the key to it is that you are immobilizing and moving part of the spine in an attempt to take pain away that's presumed to be coming from movement.

APM: And the stuff that you're putting in to enhance the fusion process, didn't you refer to that as mashed-up dead Americans in one of your —

NB: Yeah MUDA. So mashed up dead Americans. So that's one form of bone grafting. So that's called allograft and so what happens with that is…it's quite a popular form of bone grafting substitute. So you can take dead bone, so someone who's died, they've donated their bone, get their femur. You can chop it up, stick it into a vat of acid, leave it for a few weeks. What then happens is the calcium starts getting leached out and there's this mass of stuff which is sort of the slimy stuff and what that is is collagen and what are called non-collagenous proteins and they're the proteins that actually make bone heal. So things like bone morphogenetic protein and that sort of stuff. So then you'd be…sterilize that, purify it, put it in a nice syringe so it's easy enough for Mr. Chop-a-Lot, the enthusiastic neurosurgeon to then squirt it into the spine and away you go. There are other alternatives though.

APM: I hope so too.

NB: Some of which are the natural…I mean the best bone for a bone fusion of any sort is your own bone because it's got all the requisites. It's got cells, etcetera

but you can also go for something really sort of biological and then there are a lots of these bone projects which cost a lot of money.

APM: One of the questions that has come in already which I haven't actually mentioned yet is what sort of post-operative complications do you get? And particularly if you're going to immobilize the spine…bearing in mind that you started this interview by saying it's the lumbar spine that buggers up the cervical spine, presumably, you try to avoid immobilization if you possibly could. Fusion.

NB: So if you go back 20 years when I started as a consultant, there were two schools of thought, one of which was that we knew who we should fuse and the other is we didn't know which to fuse and some people did operations that caused a huge amount of damage to the spine and so the muscles were damaged. The facet joints were beaten up, etcetera and they seem to get quite good results because they could take pain away. Other people seem to do more limited operations and they have very poor results. So the first thing is that immobilization, in its own right, might or might not be beneficial. If you have a pain problem that comes from a disc that really is not moving properly…so the best example is spondylolisthesis. So if you've got a lytic spondylolisthesis came on when you were playing Cricket as a teenager, you've got bilateral pars fractures, if that goes on, it becomes really sore in later life. If you do a spinal fusion of that, that's a very, very effective way to deal with that pain. It's the best operation to do on the lumbar spine, the spondylolisthesis. If you can do it minimally invasively so you don't damage these muscles then you give that patient the ability to use their spine almost normally. So in that circumstance, actually, that has very little knock-on effect but if you go there, you know, really cack-handedly, you're pulling all the muscles apart, you're doing horrible things and you're creating a lot of collateral damage, that patient may never ever get over that problem but…and here's the issue. Over the last 20 years, what we've really learned is that there are a group of people who have mechanical pain, who, if you can pick them and do the right operation, you can get a good result and there are people who have what appears to be mechanical pain but it actually is not. It's neurological pain and they have chronic centrally sensitized pain. So this is this neurobiological alteration in the way the spinal cord and the brain is behaving. So on the surface, it looks as though they've got what everybody else has got which is back pain but actually, what they have got, what they've really got is a neurological condition. You do an operation on them, you make it worse and then you can sign in to lifelong pain, irrespective of how good you are at the operation. So the failures that you have with surgery, even if you are very, very good at selecting patients, if you're meticulous at operating, cause the least damage, the failures if you haven't had a complication is the unexpected chronic centralized pain and then those patients, there's…all you can do is hope to manage them with neuropathic painkillers and medication for the rest of their life.

APM: And what's the success rate in differentiating those two groups?

NB: I've come to realize more and more, as times gone by, and you know that because you've joined in our discussions at our multi-disciplinary team meeting, that we now have a set of signs and presentations that actually starts to distinguish people who've got chronic neurological pain and what I've been trying sort of to get people to do is to look for those to see whether actually they are beginning to distinguish between people who will respond to therapy and who won't respond to therapy. So it's all very well. If you go along to see a therapist, let's, for instance, say a physiotherapist who's doing therapy for you for a presumed slipped disc. So you're lifting something, bang, you get an episode of back pain, goes into your legs. You laid out for a week because it's so sore and then you go in to your therapist and actually, what the therapist says is, "Actually, you've got all the hallmarks for slipped disc. That's fine. Let's treat you as such." You're not getting better and then you go and have an MRI scan and it says, "Well, you haven't got a slipped disc." So there's no point in carrying on treatment because what you've got to do is, you've got to say. Well, why is it you got that? Are there any other features that tell you have not got a physical problem in the spine but you might have a neurological problem in your central nervous system? There is, global hyperreflexia. So if you then tap somebody's reflexes and they're really, really jumpy and there's no evidence that they've got myelopathy…so if somebody's, you know, 35 years old, he's got no reason to have myelopathy, so they've got no upper motor neuron signs. They've got global hyperreflexia if they have clonus at the ankle. So when you jerk the ankle up and it goes like that, somewhere more than two beats but they've got downgoing plantars. So that means they haven't got enough motor neuron lesion. What they've got is a very, very excitable neurological system. So everything's wound up. So all the impulses going in are getting amplified and the brain, therefore, is getting this huge overload of pain. If you operate on those people, actually, the wind up means that you will create a worst situation than you start and you'll probably never get them back to being anything like normal. With those, you have to treat them medically first to wind back that central sensitization and at that stage, if then you've got a mechanical problem then you could start to think about doing something about it but you mustn't operate on it before if that's the case.

APM: We've got a few minutes left and I've got a couple of questions that have come in but before we go and answer those questions, I'd like to get on to the final case that we were going to discuss —

NB: Let's do that.

APM: Which I think is this one. Do you want me to move you forward in the slide?

NB: Yeah. Well, this word is the most important thing. He's a paraglider and I wasn't aware was a paraglider was until last year. It turns out that there are a

group of individuals, I think they're all men, I don't know of any women who do it, who instead of just do paragliding, so that's jumping off a 2,000-foot cliff in Slovenia with a parachute on their back and gliding softly down there, they strap an engine on their back and they take off and do that and I've met two last year, both of whom they've broken their back. So this is the first one and what happens, he was on a race in the West United States and he just…he basically hit Mount Shasta and that was it and he got this burst fracture of his L3 and he was operated on out there and you can see there…that's the CT scan. You don't need to be a doctor to know that that bone is broken. It's not supposed to look like that in multiple parts. He was not neurologically impaired which was good. That's his MRI scan —

APM: This could be unusual, hasn't it?—

NB: No because it's L3. So actually, the spinal canal is quite big at that stage and you've only got a few nerve roots left. So actually, you can get quite a lot of damage damage. You can get quite a lot of compression. If it's up here at T10, he'd be in a wheelchair. So he'd be paralyzed. There's no doubt about that with that degree of neural compression because you hit the spinal cord and the spinal cord doesn't like it but the nerve roots on the cauda equina can get out of the way and they're OK. And you could see here this huge disruption of the L3 on the MRI scan. The whole thing's disrupted. Anyway, so he went out there and so the surgeon's out there, what they did was instead of putting screw from the back, they opened him up through the tummy and they took out the whole of L3 and they push this mesh thing inside there so that the bone they took out, they used that as the bone graft and they put this cage in this mesh and then they put these two plates on the front there and actually, it did all right. There, you see the mesh there, titanium mesh. So the screws on the side here, coming up here. This is all done from the front and the advantage of that is you don't disrupt the muscles on the back. And so, you know, there's the…so if you got to have an operation for a burst fractured L3, this isn't a bad one to have and actually, he's done very well. This isn't the same patient who's done…who's on the next video we'll see, this was the other patient who was doing much the same thing because I couldn't find the X-rays but effectively, they both, you know, ended up…sort of smashed themselves into a bit of mountainside and breaking bits of their spine and they both came under my care as a result.

APM: So that little titanium cage is full of, in this case, mashed up dead Englishmen.

NB: That's actually his own mashed up dead Englishmen and the idea, of course, is that what you've got here is that the bone can grow from one vertebra down through to the next and so you get a solid strut of bone here and that just acts as effectively as a temporary strut. I mean in reality, it's there for the rest of his life because you can't take it away. So it becomes part and parcel of the construct.

APM: And the final one then, I think probably the final one. We may have time for one more. Have we got the video?

NB: Do you want to see the video?

APM: Yeah. Let's. OK, another click will get that video going. So enjoy this video. This is what I regard as a true madman.

NB: It's a Reliant Robin.

[Audio cut]

APM: You get the gist of that. So we're back in the studio again. Tell us about that particular patient. What did you end up doing for him? You've seen him before, haven't you, for —

NB: Yeah. So he came along. He'd seen a colleague of mine because he'd broken both of his ankles because he had smashed…he got his landing wrong when he just had the engine on his back and then the canopy. He came in for a landing and literally, we've got…we've seen the video where he's got a GoPro on. You can see him land and both his legs just go straight into a rock. And so he broke both his ankles. So that was all then patched up and then of course, I got to pick him up after he had this race out in the States and he'd flown into the side of Mount Shasta and the surgeons out there had actually fixed up his back and sorted that out for him and he came back to me for his follow-up. And the other patient I saw who was doing exactly the same, he had been fixed in Slovenia. So basically what happens is they get fixed out there, come back and then I just get to gawp and look at them and say, "You must be interestingly adventurous."

APM: Eccentric I think —

NB: Eccentric. Eccentric's the right word, yeah.

APM: But I remember you saying that…it's not this guy. How long did you say he needed to recover before even thinking about getting under a parachute again?

NB: So he had all of his year booked up. So I saw him last October because he'd done it in September. He came back to the UK, saw him in October and I said to him, "Well, OK, we'll —"

APM: So he's had a month of doing nothing.

NB: Yeah, he'd been treated in hospitals a couple of weeks and then he flew back and he got to go and see me. I said, "Well, look, this is going to take you 4 or 5 months to heal and reality is you shouldn't really be doing too much to it

too quickly." "Oh," he said, "All right." I said, "Fine, all right? So happy? OK, let's see each other six weeks, have another x-ray, see how you are." So I saw just before Christmas and he said, "Can I go to Phoenix?" I said, "Will you just fly there for business?" He said, "No, I'm competing." I said, "Competing what?" "Oh, you know, paragliding, etcetera." I said, "Well, I wouldn't advise it." So then when he came back to see me for his next follow-up which was in the end of February, I said, "How are you feeling?" He said, "Absolutely fine." I said, "So what have you done? Have you managed to do your rehabilitation?" He said, "No, I went to Phoenix and I flew." So he just ignored, he totally ignored medical advice but he's fine.

APM: Which is his prerogative —

NB: It is indeed his prerogative. That's absolutely fine. I told him what the risks were. He decided to, you know, go and do it anyway which is fine.

APM: And know that you wrote that carefully down in the notes that you had advised him.

NB: It was dictated in great detail.

APM: What's your view on anti-inflammatory? Somebody in the audience wants to know about anti-inflammatories and disc prolapsed patients. GPs now seem to be avoiding apparently prescribing co-codamol if the disc is inflamed.

NB: Right. If somebody's got inflammation, you need anti-inflammatory or some sort and the best anti-inflammatory, we reckon these days is naproxen. So naproxen 500 milligrams morning, evening, 250 milligrams if you're a small person. So pros and cons of anti-inflammatory. So pro of an anti-inflammatory is that it takes away inflammation and can deal with something that's primary inflammatory which is a disc hernia. A hernia comes out, there's an inflammatory reaction, the nerve gets involved, gives lots of pain, anti-inflammatories help that. That's fine. It's good, OK. It's no good if you've just got a disc that's been pressed on by an osteophyte because there's not an inflammatory reaction there. That needs something different. The downside of anti-inflammatory is the side effects. Now, traditionally, we used to think about the side effects being bleeding complications. So if you will get a bleeding ulcer, it's a result of anti-inflammatory medication. Nowadays, we think a bit more widely and actually, we know that quite a lot of the anti-inflammatories have cardiac side effects as well and some of the really, really popular anti-inflammatories were implicated in sudden death from cardiac events. So that's then moved general practice away from using anti-inflammatories if they possibly can. But, you know, it'll swing back, you know. You've got always the trends and then somebody will come out with a, you know, a RCT and say actually, this one's not too bad, etcetera. So in short doses —

APM: And they'll carefully push all the other trials under the tables so that we can't see them.

NB: Couldn't possibly comment. But I think, actually, if you've got a problem that needs a course of anti-inflammatories, what I used to say to people is, "Look, take it for a week. Take naproxen, full strength for a week. Take co-codamol at the same time." They work synergistically. They're not working in the same way. Paracetamol works by taking away Paracetamol-orientated pain. We don't know how paracetamol works but it does. Codeine works on the opioid receptors. Anti-inflmamtories work by reducing inflammation through the arachidonic acid pathway. So they all work differently. So you're treating the pain from different aspects. You're coming at it… but if you take full anti-inflammatory, say, full dose for a week and then take off for a week and then if you need to go back on and then come off again, that seems to mitigate the side effects. So it seems to be reasonable to do it and you can therefore reduce to the least amount needed —

APM: I thought it took a couple of weeks before the anti-inflammatory process actually had any impact on the body.

NB: If you're just talking…no. If you take an anti-inflammatory, it reacts immediately and…because the best anti-inflammatory we've got is cortisone, so in reality, if you've got an acute disc hernia, the best anti-inflammatory medication for that is an injection around the nerve root.

APM: But if it's ibuprofen, for example.

NB: Well, ibuprofen works pretty well. The trouble with ibuprofen is that you've got to keep taking it and if you think about it, 400 milligrams of ibuprofen, if that's what you're taking or 600 milligrams, how many molecules have you got? A few million. Well, how many cells have you got in your body? A few billions. So you're only getting a bit of molecule where it needs to be. So you're dampening down the systemic process. So anti-inflammatories do work very well. If you want to build up anti-inflammatory medication in the body for a long term systemic problem, you're right, you need to have them for a period of time. So rheumatoid arthritis for instance, you know, that doesn't respond to just a couple of doses but a short term dose for a disc hernia, I think anti-inflammatories have a place.

APM: One final question. We've only got a minute or so left. You mentioned earlier on that fatty infiltration into the muscle. Is that a reversible process?

NB: Yeah, it is but it's very, very hard. Once you've identified…if you've got someone with chronic back pain and they have got wasting of their muscles, it's a bit like treating someone who's got chronic knee pain and their quads have gone and that is they've got to do a lot of work to get that muscle back and they can do it and we've seen it over the years. You sequentially see

people on scans. You can see their muscles get bigger, bigger, bigger and the fat then just gradually shrinks away. I don't think they ever get rid of it completely. I think once your multifidus and longissimus has actually wasted significantly, I don't think there's a chance in hell that you could ever get it back fully and get back to complete fitness but that doesn't mean you shouldn't try. You should try and try hard.

APM: That's great. Nick, it's always a treat talking to you. You're immensely knowledgeable and it's very kind of you, so generous with that knowledge.