Steven:

Good afternoon. Welcome back to the Academy of Physical Medicine for another lunchtime CPD session. We've got something really interesting in store for you today. I'm joined by two osteopaths, Rob Shanks and Darren Chandler, who you may know from their practice 'Spine Plus', but I gather that they only recently, only a week ago set up 'Go2Imaging' as you can see on the slide behind me. And they've got a real passion for what can be achieved through MRIs in particular. Rob, welcome!

Rob Shanks:

Hello Steven. Thank you for having us.

Steven:

I think Darren is still in his cupboard at the moment, but hopefully he will pop out in a minute and join us on the main screen. You and I had a very brief chat a few minutes ago about why you set up 'Go2Imaging'. Can you tell us a bit more about it?

Rob Shanks:

Yeah, absolutely. So the background really for myself and Darren is that, as you rightly said, I'm an osteopath. I qualified 20 years ago now. My mother is actually a physiotherapist, child physiotherapist. So I suppose I've always had this kind of feeling of wanting to know what other professions have to offer, and read around things as much as I could. Darren's similarly minded, and we started working together about 15 years ago in the clinic 'Spine Plus' as you said. And this all came about around 10, maybe 14 years ago when we were at a lecture being given by a radiologist, in fact one of the lead radiologists at the Royal national orthopaedic hospital, a chap called Dr Butts. And we were just 'blown away' really by the stuff he was telling us and talking about. He was mentioning things that we honestly didn't really appreciate or even heard of, such as Bertolotti Syndrome, intra and extra capsular facet joint injections and pars defects and this and that. And we came away from there thinking, 'gosh', there's a whole sphere of stuff we don't really understand. And then obviously he was going through the MRI scans and explaining what can be seen and what can't be seen in the various different aspects. And we basically just went up to him at the end and said: - "Listen, we loved the talk, it was amazing. How do we learn more of this, and would you be willing to teach us?" And so then started a very long professional relationship where we've been shadowing him, and literally we are now in weekly if not daily contact with him. And he's just been fantastic, I mean extremely amiable and just generous with his knowledge. And there's things that we've learned about MRI scans that we are really passionate about, and feel should be taught to the wider manual therapy community, physios, osteopaths, chiros, because there's lots of stuff that's missing from the undergraduate training that could enhance the practice of those professions and which could also help safeguard the public. And we're going to go through lots of case histories today to try and illustrate our point.

Steven:

I think there'll be a lot of people sympathetic to what you've just said there Rob, because certainly from my own perspective I'm in awe of people who can go through MRIs as quickly as our tame orthopaedic consultant near here does. He just whizzes through them and says, 'Ah, look at this, look at that!' And most of us, certainly when you come out of undergraduate training when you've just graduated, you have really no idea what to look for on an MRI and you rely on those few lines of text that you get from the radiologist. So where do you want us to start? There's three different types of MRI on here.

Rob Shanks:

Yeah, let's go through those. So most people when they are talking about their patients who have had an MRI scan, it will be the one that's on the left there. So with the standard MRI where the patient's lying on their back, they're non-weight-bearing and the 1.5 to 3 Tesla, that's basically the strength of, or the pixelation if you like, the quality of the image that you get. Sothe 3 Tesla is obviously higher than 1.5. 3 Tesla' are quite good for looking at peripheral joints, cartilage detail, surfaces of joints, that sort of stuff.

The 1.5 Tesla' have been around for a lot longer, but I would say for spinal stuff they're still pretty good and in some cases can be slightly superior. They'll show up things such as modic change a 3T may miss. But that's the standard one. Then you've got these other types of scanners where you've got the middle one, this is the open scanner. So for patients who are claustrophobic and don't like the idea of going in those tunnels: - if anybody's had an MRI scan they are really closed, really tight, they're here just in front of your nose, and they make a lot of noise. So it's quite understandable that some patient's need that open scanner.
Steven:

Why is the power so much lower?
Rob Shanks:

Yeah, absolutely. So the lower power: - I don't know the technical reason why, but I'm guessing it's just a much more expensive scanner and machine. And consequently the price tag is higher for those. So let's say, if a standard MRI scan these days you can get for say £200 or £300, the open scanners will be probably at least twice that. Now the similar one to an open scanner you'll have on the right there a dynamic or an upright scanner. So this allows patients to be imaged standing or sitting and even in degrees of flexion or extension. Now again, we'll go through examples of that later on, where that can really come into its own sometimes with the diagnostic imaging of a patient who predominately only has pain in one particular position. So if they only get sitting pain, it makes sense to scan them when they're sitting rather than when they're lying down. I think the statistics are that about 30% of the time, those weight-bearing scans, for the spine anyway, will show pathology that's missed on the standard lying down supine ones.
Steven:

Yeah.
Rob Shanks:

So if we go to the next slide Steven, here we go. So this is now getting into the 'nitty-gritty' of what we see when we open up and we see an image of a spine. And this is what we call a sagittal image. This is the sideways slice coming down the middle of the body, and most people will have heard these terms T1 and T2. We'll come onto the STIR in a minute. I think Rajeev did mention briefly some STIR sequences in his talk in the week. But I'll explain a bit more in a minute.
Steven:

We've had a couple of talks in the past on MRIs as well where the STIR has been introduced, but I suspect you've seen those.
Rob Shanks:

Yeah, absolutely. So, a T2 weighted image is basically where water and fat are both showing up as bright. So if we look at the cerebrospinal fluid down the middle of that spinal canal just to the right of those discs, that's it. So that's the cerebrospinal fluid that's showing up as bright. Now similarly the subcutaneous fat, so just the other side of the spinous processes to these, that's it. So that is also bright. So now we've got fat and water as showing up bright. And the way to remember this, if you think of the formula for water H2O, there's the 2. So you've got T2. T2 is basically water and fat. Now contrast that to the middle screen now. We've got the T1 image. And the difference here is that the subcutaneous fat is still bright, but now you notice how the cerebrospinal fluid now is darkened. So the water is now showing up as dark. And you'll also notice that the bones, the vertebral bodies are slightly differently shaded. You can see a little bit more bone detail. So the T1 image is more appropriate for bones. So again, think of the spelling of the word 'one' and then 'bone', but with the 'b' in front of it. That's how I remember, or how most people remember. T1 good for bones. T2 good for water. So what's the point of all this? The reason is that we want to see the water because you want to see where there is water that shouldn't be there, i.e. Inflammation. So you can have inflammation around the vertebral body, you can

have inflammation around the soft tissues, but the problem then can be that sometimes some of those soft tissues will have natural amounts of fat in and they'll have some water in. So then you need to suppress the fat in order to highlight the water. So that's your STIR sequence, and the STIR sequence is a fat suppression sequence. So that basically means that the fat now has become darker. So you'll see on the right hand image that the skin, the subcutaneous fat is now darkened, but the water and the cerebrospinal fluid is now bright. So that's a really useful scan. And the thing to remember however is that you don't always get a STIR sequence done as standard. So it's something that you sometimes have to ask for. Now, the advice would be that in any patient who has had a trauma, you really want to be getting a STIR sequence done because you could be missing pathology without it. So sometimes they will do that as standard, but unless you ask for it, it may not be done. Okay, lets move on to the next slide Steven. And we can see now this is now moving slightly away from the centre. So the slide on the left is again a sagittal image straight down the middle, and we're now moving slightly lateral and we've got what we call a para-sagittal view. So it's slightly off centre and what we can now see is a neural foramen. So you're starting to see this little key hole sign and you've got the exiting nerve roots. So where it says E N R, these are the nerve roots that are coming out through the lateral foramen.
Steven:

I can point at these, but the audience have got the slide up full screen at the moment so they won't see me pointing.
Rob Shanks:

Okay, so when looking at scans and loading up the images, you really want to start perhaps on the sagittal image anyway, the middle slice. Have a look at the detail of the discs, but then move out to the para-sagittal, and then look at: - can you see that the exiting nerve root nicely contained within that key-hole in the foramen. And if you look really closely enough, the detail might not come out on this particular screen, but you can even see the perineal fat. So you have the nerve, and then you have the fat around the nerve, and that's the key thing you want to look for, to see if there's any impingement in that foramen.
Steven:

Just interrupting you just to reassure the audience that the download for this, all these slides are on handouts which are already available on the recordings page for this broadcast. So they will be able to get these slides themselves afterwards. And when we come to looking at specifics of individual cases, you're going to share your screen and point at it with your mouse aren't you.
Rob Shanks:

Absolutely yeah. Darren's going to take over and do some case histories with you in a second. Let's go to the next slide, slide number four. So this is what we call the axial slice. So this is the slice through the middle of the body. And what we've got there is, you can see the disc in the middle and you can even see the nucleus pulposus, that central part of the disc, that gelatinous hydrostatic part of the disc, the outer fibers of the onions. We've labeled it all there for you obviously. But the thing on these images to look for, and what you have to think when you're looking at the spinal structures: - you see where we've got the spinal canal in the middle, and you've obviously got the descending nerve roots and the cauda equina coming down centrally. You then come out to the side of there and you'll see the lateral foramen and then you see the exiting nerve roots at that level. This is quite a normal disc and this is showing quite a patent foramen and there's no nerve root compression. But if that space gets narrowed, then that's when you're potentially going to have trouble and possible signs of nerve root impingement. And obviously then we've got the facet joints at the back, the spinous processes and then either side of that the erector spinae muscles as well.
Steven:

Just looking at this slide, I'm reminded of when we had our orthopod Nick Birch in. He had a number of slides and he drew attention to the fact that you can very often see large differences in the size of psoas muscle, and that also can be indicative of something which merits further investigation.
Rob Shanks:

That's right. And it's actually as you say, it's very important, although I've gone straight to the spinal structures, it's very important to have a think about not just the spine, but to look around it. So again, we've labeled on here the aorta, the IVC, inferior vena cava, as you rightly say, the psoas muscles, and you'll even see coming outwards from there, it's not very clear here, but in certain slides you'll see the kidneys. And it's always important to have a little think about those extra spinal structures as well.
Steven:

I got two questions for you already. This is one Justin's just asked this, and it is a stunningly obvious question to ask and I have no idea what the reason behind this is. But he wants to know why do people have to go into an MRI scanner head first, because they hate it. Or many of them do.
Rob Shanks:

Well it depends on what part of the body you're having scanned. You don't always have to go in head first. If you're having your ankle or knee done they quite often will try and put you round the other way. But I think the truth of it is that people do go in as you say quite deep, and I think it's because the mechanics of the MRI are in the middle of that tunnel essentially. And that's where they need to get you to have that scanning done.
Steven:

And the other question was from Emma. She has asked: - 'can you just re explain again why you need a STIR sequence if there's been trauma.'
Rob Shanks:

Right. So basically if there's been trauma, then you're suspecting there's going to be some inflammation, some swelling around somewhere, and it's the STIR sequence which is going to highlight that the most. For example, think of the inter spinal ligaments: - they could have some fatty tissue in them, or in the case of trauma they would have some water, and on the standard T2 you won't be able to see the difference. It would just look bright. Whereas with the STIR you've suppressed the fat, so anything else that's showing up is going to be potential trauma.
Steven:

Right. Okay. Let's move on.
Rob Shanks:

Let's go to the next slide, number five. Right, so we're getting a little bit of pathology now. So this is a case we saw in clinic of a 50 year old lady, a medical tourist who was in the UK for a few months. She had this sciatic pain going down her left leg that she just couldn't get rid of. She had actually seen a colleague of ours initially and she was having some manual therapy and it just wasn't shifting. After a few sessions the other therapist was suspecting that she had some sort of disc problem, and since the symptoms did correlate with a disc problem we decided to get her scanned just to be sure. And it actually threw up something slightly unusual that we weren't necessarily suspecting first off, and we've labeled it on here. And this is a facet joint cyst. So that little out-pouching of fluid, just on the axial image there Steven. So that's actually coming from the facet joint itself on the left hand side. And it's essentially just swelling within that capsule and it's pouching out and actually hitting the descending nerve roots. So what we've got here is the L4/5 segment, so the nerve coming out at that level is L4, but the nerve that's going down the canal before it exits at the level below is the L5, and you can clearly see that facet is contacting the L5 nerve root. So that was very indicative that that was the source of her pain.
Steven:

Just before you go on, Robin's asked whether on axial slices we're always looking up the body, and I can pretend I know lots about MRIs by saying 'yes' we are, we're always looking up the body, and it's about the only thing I know about MRIs.
Rob Shanks:

Absolutely. So yeah, I should have mentioned that. So you were absolutely right. So it's just slightly confusing. What we're seeing there on the left, on the right hand side is actually the left of the patient. So the head's at the far end and their bottom is behind us. We're in the middle of the spine looking upwards towards their head. Correct. And obviously the bottom of the screen is their back in the top is their front. So yeah, just think of it that way. You're looking up. But yeah, where did that lead us to? So it meant that obviously we clearly identify the source of the pain and we needed to then look at some form of different treatment. And in this particular case we referred her over for a high volume saline injection and that was basically to burst the cyst and which was very successful, relieving her pain literally within one procedure. We'll do one more slide and then I'm going to hand over to Darren. If we go to slide number six. Now, I've put this up because this kind of illustrates to me pretty well where the loop holes come. So we start off as a referrer - it could be the GP, could be the surgeon, could be the therapist or us as therapists. And then we refer the patient on to an MRI scan. And the thing to remember is that when they go for their scan, they are 'meet and greeted' by a radiographer, the person that puts them on the scanner. And that radiographer is responsible for putting in those settings, the T1s, the T2s, the STIRs. Obviously if we put it on the report that we want a STIR they'll do a STIR. If we haven't mentioned anything like that they may or may not put it on. And bear in mind they're not going to go through a detailed case history like we do. They're not going to examine the patient like we do. So there's already a little bit of potential for miscommunication, things to be missed here.
Steven:

Is that an extra cost to have a 'Stir' sequence or is it just a click of a button and it's another report that comes out?
Rob Shanks:

No, absolutely not. I mean, you're right in that if you start asking for too many sequences you might end up with a slightly more expensive scan. But in the case of STIR I'm pretty sure that it won't cost any extra. It doesn't take them much longer to do. So it's well worth asking in most cases.
Steven:

Carol has asked whether you would always ask for a STIR sequence for any inflammatory condition you suspect such as RA, she says here.
Rob Shanks:

I mean, to be honest, we pretty much ask for a STIR all the time, but the reason why I'm mentioning it is because like I say, if you don't ask for it you can sometimes not get it. So it's such a useful extra sequence to have for no extra cost. It's almost always worth mentioning, I would say. Now, the other thing that you've got to bear in mind as well when the radiographer does this: - it's not just the sequences that they're setting, they're also setting the actual segments that are going to be scanned. So let's say for example, the patient comes with thoracic pain and you tell the radiographer that there's pain around the T11. Well then the chances are they will put those axial images through the T11. But if the patient has another point of pain and you don't mention it, they may not do those actual slices. And I saw a classic case where that happened not too long ago.
Rob Shanks:

It was a young tennis player who came in who'd been having months of thoracic back pain, and initially you thought he's torn a rhomboid muscle, he's over-training, we've got to tweak his exercises. And it was actually a physio who picked up on it and said: - 'this patient's not getting better'. They had actually referred him to an osteopath, the osteopath had then referred them for a scan and then they came to

me. And the report had mentioned a few things: - he had a Schmorl's node and a little bit of degeneration around his T6/7, but the actual slices had only been done at T11 and hadn't been done at T6/7. So this report came back and it was relatively normal, but because I put the images in, 'cause I was quite happy to look at the images myself, I was straight away able to identify that they hadn't actually done slices through the area where he's got his pain. So this report actually isn't really that relevant for this patient 'cause they haven't scanned the right area. Now I asked for the re-scan and this chap actually ended up being diagnosed with an osteoid osteoma, which was something nobody had really thought of before. Everyone had been assuming it was mechanical. He was so active. He Is such an athlete. And I think that illustrates the importance of knowing the process and being confident to challenge the report and ask for another scan. So again, just looking at this diagram, you know the radiographer then passes the images onto the radiologist and the radiologist then reports on those images. Now again, the thing to remember is that radiologist, a medical doctor who's reporting on the scan, isn't in communication with the patient. They don't examine them and they don't even speak to the patient. Again, completely relying on the fact that the radiographer has done the right images, the right sequences and that they're getting the right information from the referrer. So the referrer's letter will go to the radiologist, but if it's not detailed enough they may not know what to report on and what's relevant.
Steven:

I asked this question of somebody a few days weeks ago, I can't remember now, it's all blurring into one over this lock-down period. But surely the radiologist has an input in telling the radiographer what they want to scan. Or does the radiographer decide that himself?
Rob Shanks:

No, not usually. I mean you're right in a sense. Yeah they are. They can be in communication, but the flow is this way. This is the standard way it would go. You're right, if the radiographer has a query or isn't quite sure, they can pick up the phone and ask for advice. But if you think about how busy these places can be, this is where the loopholes can be. 'Okay Great. Yeah we've got this information. We've got OA. Just wants a T11 scan. Okay. We're suspecting some sort of a disc problem. Okay great. Let's standard it to.....' - Whatever it would be, and that's how things can get missed. And then obviously the report comes back to you as a referrer, and then what can happen often is that we place all our weight on that report. We're assuming it's absolutely gospel. Whatever's on that report is absolutely correct. There's nothing that's been missed. There's been no omissions. And sadly, it's just not the case. Darren and I see this on a weekly basis that there's things that are missing. But that's the extreme case, the osteoid osteoma.
Steven:

I guess as time is marching on with this broadcast we want to get on and hear all the various stories that Darren has. But can I just ask one question before we move on? If they haven't done an axial slice of whichever area you want, do they have to re-scan or can they go back to the original scan and then create the actual slides from that?
Rob Shanks:

No they have to re-scan.
Steven:

Okay. Right let's move on to Darren. Darren, hallo.
Darren Chandler:

Hi Steven, how are you?
Steven:

I'm very well, thanks. It's about all these cases where you've caught the radiographer's, radiologist's out.
Darren Chandler:

I am, I am. I'm going to take you through it all.
Steven:

We ought to emphasize we're not here to criticize radiographer's are we, or radiologist's!
Darren Chandler:

No. I mean we're not. We're not here to criticize anyone really. But I think you'll see from the following slides that I'm about to show you, there is a kind of unacceptability really of what gets done on a daily basis. And I think as therapists we're all trying our best, and to get imagery and reports back in sometimes the way we do, I think it can be a little bit unfair. So, you know, there's a kind of balance with regards to the radiologists. But lets click-on and we'll go to our first case. So we've got case history number one. We have a 29 year old male who was playing football, and as he kicked the ball he instantly had pain down into his left leg. And about a day later he started getting numbness in the S1 dermatome. And it had been going on and on. He went and saw a therapist and they diagnosed that he had more left lower back, more buttock with S1 numbness. They'd surmised that there was potentially a piriformis syndrome going on and then hence a little bit of lower back spasm. So they treated a few times and unfortunately it wasn't getting any better, and if anything the numbness was progressing. So he came for a second opinion and I sent him for an MRI scan. So I'm going to just bring up here if we can. There's a slide of the radiologist's report, which is number seven, and you can see it's just typical findings really, but it basically highlights that there's no posterior disc protrusion present. There was no canal stenosis and nor was there any nerve root compression identified. So I think when you're faced with that straight away, if you think it's not coming from the spine, I think as a therapist we then start to 'tick' and go down that diagnostic sieve of thinking, okay, is it coming from the pelvis? Is it coming from the piriformis, common peroneal nerve etc? Is it, as Simeon would say, trigger points in hamstrings etc? So you can see then you start to go down a specific road.
Steven:

And where we feel safe to continue with manual therapy, don't we!
Darren Chandler:

Yeah exactly. Everything's kind of okay so we continue with it. And then on the next slide, I don't know if we've got that one there. Again, I just want to really get the conclusion here that there is no nerve root compression. So like you say Steven, we just continue on our route, and actually I wasn't quite sure with that. So I then went over and actually looked at the MRI scans myself, and if you can bring up in the next slide which is the sagittal and axial images of that.
Steven:

Darren, are you able to share your screen so people can see you pointing at things on this, because that might be helpful on this one.
Darren Chandler:

Okay, let's click on to that. So if I bring up that one there. Yep. You got it. Okay, brilliant. So you can see on the left hand side of the screen we've got a sagittal T2, and it does look pretty much unremarkable, and the discs are of good height. Yes, there's a little bit of narrowing of the L5 posterior disc. That again is pretty unremarkable. But what we're more interested in is this area here. So again, as Rob's just explained, we're looking at an axial image here. Now the green arrow there shows a broad based disc protrusion. Okay, so this is what would be known as an annular protrusion, and it's broad-based because it's bulging from the right side all the way over to the left side. But the red arrow, that clearly demonstrates that the grey area between the facet joint here and the annulus fibrosis, you can see there's an irregularity of grey tissue, and that's the descending S1 nerve root. So the descending S1 nerve root on the left there is actually deformed due to a compression via the annulus and being forced up against the left facet joint. So there's clearly, if we go back to the report, the radiologist has clearly written that there isn't any disc protrusion and nor is there any nerve root compression. So you can see

how it's so frustrating for us as therapists, but equally for the patient, because they would then go down this road of potentially having their hamstrings, pelvis and piriformis worked on, and it's a shame because ultimately it was there in the first place, but for some unknown reason the radiologist has failed to report it.
Steven:

Do you want to un-share your screen for a second there Darren.
Darren Chandler:

Certainly. So it's like Rob says. If I send for 10 scans a week I'd most probably see this seven to eight out of ten times.
Steven:

Really?
Darren Chandler:

Oh, I'm not kidding. It's that prevalent. But the problem is you tend to ...
Rob Shanks:

Well not necessarily disc bulges that haven't been reported, but subtle findings though.
Darren Chandler:

Yes, subtle changes. Not necessarily like you say with a disc, but it will be just subtle changes that make a difference with regards to why the patient could be potentially suffering their symptoms. So yeah, it's happening quite a lot.
Steven:

I think what people are going to find surprising is, not that a radiologist might miss incidental things that they weren't looking for, but if you say we think there's a problem with the S1 nerve root, the idea that they could miss an S1 nerve root compression seems very surprising indeed.
Darren Chandler:

Yes. But I mean. Like I say.....
Rob Shanks:

Sorry, can I just butt-in there. You're absolutely right. It is a bit shocking and we're not trying to slag off anybody at all, but we're just trying to make people aware of the fact that these things do get missed unfortunately. And even worse than that, you can have very serious spinal pathology missed. I had a case a year or two ago of a lady, again in her fifties, long history of low back pain. She came in, she saw a colleague of mine, had six treatments, was no better, in fact she was getting worse. He asked me to review it. Our understanding was that the MRI report was absolutely clear, nothing wrong. I asked her for the copy of the report, I had the report, and on that report literally was a two or three line sentence - 'no abnormalities found'. And I was instantly suspicious. I thought, hang on, this is a duff report. This isn't a very good report here because they haven't gone through it in detail. Anyway, I asked, the patient to get the images of the MRI for me. It took quite a while to go through all the loops of doing it because it was an NHS scan. Anyway, we came back and we put the scan in and again, long story short, she had an osteoid osteoma that had not been reported on at all. I mean, literally it was there within the first 10 seconds of me seeing the axial image. Wow, that's not right! I sent the image over to Doctor Butt, I said -"so just tell me I'm on the right lines here, this is something very serious!" He said, - 'yes, a hundred percent'. You know, and that was again a very serious case, and that lady luckily was then referred on to the sarcoma unit where she got the right treatment, but if that hadn't been challenged she would have been running, going around. She was being told that it was all psycho-social. She would have to have counselling, pain management, all in her head. And it wasn't, it was an osteoid osteoma. So it's out there. And that's an extreme example. We don't see those 7 out of 10 times every week, but we do see

those examples relatively regularly. You know, we'll have at least a few of those a year that come in that are missed.
Darren Chandler:

And I think Steven, if you go to the next slide after that, I actually phoned the consultant radiologist up and asked him to re-report it, and as you can clearly see, he then writes on that there is a deformity of the left S1 nerve root and that he agrees with me that there is a compression from a left sided annular protrusion. So, why wasn't it done in the first place! But unfortunately it was there and it's why it's so important for us to just have the basics I believe, understanding of just being able to look at a sagittal and an axial, and just look to see if the symmetry and the quality of the image and the disc itself is as it should be etc.
Steven:

Because you said it's important for us to look at these things, Dawn has sent in a question asking what's the best method for us to use to look at MRIs in our own clinic, because you can't just take your disc and plug it into your computer and see them, obviously?
Darren Chandler:

You can. What's happened now is, since the GDPR ruled, they have put passwords. It's generally the patient's date of birth. But what happens is, if you're using a Mac computer you can use a free software which is called Horace. So if you download that you can instantly put the CD in. But since GDPR is password protected, it has actually software built into the CD, which is called like a DICOM viewer. So as soon as you put the CD into any PC, as long as you put the patient's date of birth in, it unlocks and you just click on DICOM and then all of the images come up. So anyone can view them on any computer as long as you've got the password.
Steven:

I know in our clinic we use OsiriX which is a really useful way of comparing sagittal and axial at the same time.
Darren Chandler:

We'll go to the next patient. This is a great patient, this one. Okay. So it really is. This is like the epitome of MRI scans really. We have a 44 year old male who presented in clinic. He reported that he'd been having lower back pain, specially sacral area pain, coccyx pain, as well as having an L5 radiculopathy on the right hand side. But the main thing about this patient was that he was very much 'at the end of his tether'. He had had it since he was eight years of age. He always remembered having it. He couldn't remember a particular trauma, but it was there and it was a groaning, low grade pain. He said that he had seen various therapists and you can see on the screen here, that because the pain was so localized that first thought of in his early twenties, thirties, he saw an osteopath and they believed that potentially he had a coccydynia issue. So they went on to do some internal adjustments, and I think he even said he had three internal adjustments. It never worked ultimately. He then saw a physiotherapist who suspected potentially piriformis syndrome, again because he had that deep gnawing pain into the right buttock. But his pain just never cleared really. And then a chiropractor he'd seen previous before coming in was under the impression that it was an SI issue with some torsion and again there was piriformis involvement. But one thing to take from this chap was that, like all therapists, like we all do, when we was doing our case history, he kind of slumped forward throughout the entire talk. He was leaning forward on his chair and he said: - 'you know, if only I could be in this position all the time, because when I'm flexed I have no pain at all.
Darren Chandler:

And if I bend and touch my toes, I have no pain at all. But as soon as I stand and as soon as I walk I'm in agony'. Now I would have thought, for a lot of the therapists listening in today, when you hear the words eight years of age, we might think: - is this a sero-negative arthropathy? Is there a kind of ankylosing

spondylitis picture? Is there a developmental or congenital issue? So this was all going through my head, but, you sort of feel he's very happy when he's sedentry, but he's in a lot of pain when he's on movement, and that didn't really fit that, you know, ankyspond' picture for me. So I sent him for an MRI scan, and if you can bring those two up, that's brilliant. So as you look at this scan here, so we've got a T2 sagittal, and the T2 sagittals - they look again pretty much unremarkable. He's got a slightly high sacral base. But overall you would say it looks pretty good. But, I don't know if you've got your cursor there Steven. If you go to the anterior superior body of L4....
Steven:

We can only do this if you're sharing your screen Darren, because the slides are on a different computer.
Darren Chandler:

Okay. Let's share that one. You got it?
Steven:

Not yet, but bear with us. Zoom sometimes takes its time in bringing up screen-shares, we've found. There we go! No no!
Darren Chandler:

No? Okay. Not yet?
Steven:

No, I'm not seeing it.
Darren Chandler:

Okay. I'll come out of that. Maybe we'll go back to where we were. Okay. So for anybody watching, the L4 vertebra there, just in the top left hand corner of it. That's it! Perfect! You can see that it's got a little white area. Now that white area on the T2, as Rob just clearly said, you know it could be oedema and it could be some fatty tissue, but in this case it's showing bright, which indicates that potentially it could be a slight bit of fluid in the bone. Now when you see that sign, - let's just say we were to do 10 MRI scans of the lumbar spine. You know, five of those people might have that sign, and it's completely incidental. It's kind of a normal finding. But in certain cases such as ankyspon' patients, they do present with that little lesion. Okay. And they can have it in various bodies L4, L5, L3. So what's happened here is, the radiologist has looked at this, seen that little lesion and then gone on to report the scan. So if you could bring up the next slide which is the radiologist report, and it's kind of quite comprehensive. He actually says that there's some subtle end plate column marrow signal changes, and it's raising the worry that this patient has got an inflammatory arthritis. So he was requesting that we do the HLAB 27 and potentially go on to do a sacroiliac scan, and that would obviously be to rule out whether the patient had sacro-iliitis. So what you're looking at here on the screen is literally what I got back on a report. So it had, there was no nerve root impingement, but it was high suspicion that he was a serum negative arthropathy patient.
Darren Chandler:

Now that didn't sit too well with me because, although I had thought about that in the back of my mind, you know, like Robert just said, I was the one who examined him and it was me that saw him happy in flexion and pain on standing and extension. And I would have liked to have seen a little bit more on that report, especially talking about the posterior arch of the lumbar spine. And when I say posterior arch, I'm talking about the facet joints, I'm talking about the lamina, ligamentum flavum etc. So I then, if we can just quickly go to the next scan. There we go! So I then put the patient's MRI scan in. Now this is just a brilliant picture here. So on the left hand side, for everyone watching, we have a so called normal L4,5 axial segment of another person at the age of 44. Okay. So we can clearly see here we've got the two facet joints either side of the spinal canal. But if you look on the right side, it's our patient that we're talking about. You can clearly see that his facet joints are deformed. They're asymmetrical. So the one on the right side almost looks like a boxing glove, and the one on the left side looks a little bit like a giraffe's

head. But you'll also see the spinous process: - it looks very skinny and then it goes quite sort of bulbous. So you can clearly see there's a developmental issue here with this chaps facet joints. And if you go to the next slide please, Steven. So this is the L5, S1. So again, for a comparison, I've put the axial up on the right of somebody that's so called normal. And the one on the, sorry, on the left. And on the right hand side, again, you'll see that there's a hypertrophic facet joint of L5,S1, a very underdeveloped, left sided facet joint L5,S1. But more importantly here is that on the, if you look at the green arrow, that's the nerve root, the exiting L5 nerve root, and it's spherical, it's round, it's perfect, it's exited the foramina. But on the right hand side where the yellow arrow is, you can see that the L5 nerve root is compressed because it's gone the sort of 'strangling' you know. It hasn't got that nice spherical look to it. So the exiting right L5 nerve root is being compressed in this picture. So I think, you know, we need to all sit back at this point. And you know if he was in my position, here we have this patient who for 44 years has been suffering with lower back pain. He's 'at his wit's end' and yet we've just been given a report which in part is actually quite comprehensive because he managed to spot that small high signal which could have then taken us towards enthesopathy. But at the same time, as we said earlier, the elephant in the room has been completely missed. This chap, poor chap has got congenital issues, developmental issues with his joints. So again, I got in touch with the consultant radiologist, and if you just bring the next slide up for us please. This was an addendum.....
Steven:

Can I just stop you for one second? I'm going to ask a favour. You know we're almost up to two o'clock. Are you guys happy to carry on for another quarter of an hour or so?
Darren Chandler:

Yeah!
Steven:

You are, brilliant! So apologies to the viewers who may have something else planned, but this is just too interesting to stop at two o'clock just for the sake of the clock. We're going to go on and look at these further images. So is this the one you wanted? Sorry!
Darren Chandler:

Yeah. So thank you. So I spoke to the consultant radiologist and you know, I said to him, you know I actually did say, you know, - "Were you actually wearing a bilateral pirate's eye patch'", because how he missed it I just don't know.
Steven:

That must have gone down very well!
Darren Chandler:

Well exactly, so I like to keep them on their toes. So he then wrote the addendum and sent it into us, and this is what he re-wrote. You know, 'there is a deformity. There's incomplete bony fusion which is developmental'. He's then even gone on to say 'there's kissing spines and there's hypertrophic facet joints'. But more importantly 'there is the L5 nerve root block', you know, a compression, and you know, he kind of sums it up at the bottom. 'This Represents the patient's mechanical symptoms'. So you know, if you never took the trouble, or you just didn't have the experience with this chap, it would have been like the previous kind of poor therapists in a way, because they were doing their best, but unfortunately we've just been let down really, and I kind of feel like it's a substandard way of reporting.
Steven:

I wonder if you know, in defense of the radiologist, he's probably seeing hundreds of these in a day. He sees what stands out to him or her as a glaring problem. He says, - 'right, that must be it', gets the report out and goes on to the next one,
Darren Chandler:

A hundred percent. And I've spoken to them about it and they all say that, you know, they're under a lot of pressure. They've got hundreds to report and sometimes they just sort of wiz over them. But quite often.....
Steven:

We've got a pretty healthy audience watching this today, including a radiographer, Jennifer, and she makes the point here, she said: - "It could take all day for a radiographer to produce transaxial images on every spinal level. If you need specific levels, you need to write that on your referral". She obviously knows you know that, but for the benefit of everyone else watching, - Jennifer, that's really useful for us to know. Thank you! Can I just drag you back to your slide 11 again? 'Cause I was looking at that and you talk about this sort of little white area at the top of L4, and it shows up better over there, but there's a fairly glaring white streak here in the posterior aspect of all of these vertebrae. Is that normal?
Darren Chandler:

That's the artery. That feeds the artery.
Steven:

Okay., right. So it's not a flaw in the.....
Darren Chandler:

No, it's bone itself. So yeah, sometimes it can be very bright as well. It looks like pathology.
Steven:

Yeah. Okay, can I run through a few more questions since I've rudely interrupted you? Fenula asked some time ago, what 'STIR' actually stands for.
Darren Chandler:

Okay. So that stands for a 'short tau inversion recovery'.
Steven:

Okay, which doesn't really tell us very much, but it's very useful background knowledge.
Darren Chandler:

It's basically an inversion of a T1. So T1 really highlights fat. They invert it, flip it, and then it really highlights the fluid, if you like, and suppresses fat. So it's just an inversion.
Steven:

Going back to your case history of the chap playing football, I think your first case history. Jonathan Hearsey said: - "But what did you actually ask the radiologist", because you obviously found some extra findings on the scan. "Was There enough clinical detail in the requests that you put to the radiologist in order should they have found what you were looking for?"
Darren Chandler:

A hundred percent. So whenever I do the referral, I will always write down: - patient has got 2 out of 12 pain, left sided lower back with L5 or S1. I'll always pronounced the dermatome in which the patient is suffering with. So there was really no excuses from that person.
Steven:

We've got a lot of people asking how you get access to a patient's MRI scans.
Darren Chandler:

Well generally because I am the referrer I've got this PACS system. So if your, let's just say in association with an MRI center to who you send to, they will set you up with your own PACS system, biologic systems. So I can communicate with radiologists direct and look at the scans online. But quite a lot of people come in with their CDs, so we just put them straight in and look.
Steven:

So the PACS system you're talking about: - that's going to be a private system. It won't happen if you're referring people via their GP for a scan.
Darren Chandler:

No, that's right. It's a private system with the company.
Steven:

And somebody else is asking how much it costs actually to get a private MRI.
Darren Chandler:

Literally it ranges from £225 to £1000 depending on what part of London you're going to.
Steven:

Okay. Well, you're in London. And to answer it from my own perspective, there is an MRI centre on the outskirts of Birmingham in Sulihull run by Roger Batu who has been into a couple of broadcasts with us. I had a full MRI scan for a patient there not that long ago and that was 500 quid. So I don't know whether people are in range of that particular place but I can give them details if they want. The cyst that showed up earlier on: - Laura has asked how common cysts like that are.
Darren Chandler:

Well they're not that common, but I mean, I would say you might see in a hundred scans, you might see five. I'd say five cysts out of a hundred. Not that common really.
Steven:

Right. Okay. We've got a few other questions which I know we're going to answer towards the end of your broadcast, but I suspect you want to move on to the next case.
Darren Chandler:

Yeah, there's a very good case, and this kind of comes back to what Robert was talking about earlier in that here's a patient who has lower back pain because he was drunk one Saturday night and slipped and fell on the steps and landed on his lumbar spine. He's had that pain now for six months. He's in a lot of agony, and again, he's been to see various therapists and wasn't really getting anywhere. So we did an MRI scan and it came back completely normal as you can see: - conclusion: unremarkable. So we'll go to the MRI itself, and this is why STIR sequences are so important. So if you can see on the left hand side,we have a T2, T1 in the middle and a STIR on the right. I just want everyone to focus their eyes on the subcutaneous fat. So if we look at the spinous processes and we go to the right of that area, you'll see there's a high signal line which is the white subcutaneous fat. Okay. Now if you look at it on.....
Steven:

They can't I'm afraid because they've got full screen of your slides so they won't see me and they won't see your cursor. If you could share your screen It would be useful but it doesn't seem to be working terribly well.
Darren Chandler:

I think this is quite a subtle thing. They might not know what we're looking at unless you point it out.
Steven:

I can't Darren. Its coming from a different source. They've got full screen of your slide and I can't point on it.
Darren Chandler:

Oh okay sorry. Okay, well all I would say is is that if we concentrate here on the STIR sequence, if you look at that screen, that's right, the far right one. If you look at the subcutaneous fat, you can see that there is a high signal of fluid which is running down the back of the supra-spinous ligament. So you can see the back of the spinous processes. There's this white streak of fluid just in front of the fatty tissue.
Steven:

Justin, can you bring up my shot please! Thanks. So we're looking at spinous processes here, at this streak of white coming down here, that being the subcutaneous fat here and here.
Darren Chandler:

Yeah. If you look at L1 vertebra and go posterior to it, that's it. Go backwards. Good. Keep going, keep going, keep going, keep going, keep going. Stop. Now go up, go up, go up, go up. Stop. That's it. So what you're looking at there is soft tissue oedema. We're looking at .....
Rob Shanks:

Just above it Stephen. Just above where you were. Go to the right.
Darren Chandler:

That's it. Go to the right, stop.
Rob Shanks:

There that's it. You got it.
Darren Chandler:

What your looking at there is soft tissue oedema. So this chap has swelling, bruising of his soft tissue. Now if you look at the T2 scan and you look at the T1 scan, can you see how you can't differentiate that, hidden within the fatty tissue. So this is so important to get it across that you must request STIR sequences when you send for scans because this patient then went on to have a subcutaneous corticosteroid into that tissue and his pain went completely away, and yet he'd had it for six months prior to having it. So without that STIR, no one would have had a clue that that was the cause of the patient's pain.
Steven:

Yeah. You've got another one here, a fourth case history with .....
Darren Chandler:

Yeah. So just to wrap up on this one. To the untrained eye, - and I've done a little video of this on our website. Don't get caught out by this, and that is to look at the spine straight away. Again, you always want to look around the spine. Look at the kidneys. Look at the aorta. Look at the pelvis, and you'll clearly see, here is a 55 year old lady with bilateral pins and needles and numbness with some myotomal weakness in the S1 distribution. Everyone she saw suspected that she had a disc prolapse, the central canal lesion, but unfortunately for this lady, can everybody see, there's an apple-size tumour on the anterior surface of her sacrum. And you can see in the middle picture the blood supply that it has at the very bottom of it. And if you go to the STIR sequence, the coronal view at the far right, you can see that the STIR sequence lights the tumour up like a Christmas tree. But again, unfortunately this was missed by the radiographer who was doing the scan. So we got sagittals, but we didn't get axial views to go through in order to see what the consistency was of the tumour. So it's something to be aware of. You don't see these a lot, but we automatically think there's a central canal lesion when actually it can be pelvis led and crushing the exiting S1 nerve roots as they pass through.
Steven:

You've put up a shot here of some screws.
Rob Shanks:

Oh yeah. So this is a patient of mine, and again, a bit of a story behind this one. So this was a chap called Alan who came to see me having had a spinal fusion done and he was still in pain. And all the reports coming back from the surgeon said everything went okay and the surgery went according to plan, but he still had this persistent pain down his leg, and to be fair, he was a little bit better than he had been, but he still had this pain. And we just thought initially he would just need some postoperative rehab, but anyway, again, I went to the trouble of requesting his images. Now this isn't actually an MRI. This is actually a CT scan. The reason why it's a CT scan is because the screws on an MRI scan would show up a

lot of artefacts and would come up very bright and shadowy and obscure everything. So he had a CT scan, and I think everybody can see here, that one of the pedicle screws was going right through the middle of the spinal canal. And basically they kind of pulled the wool over his eyes. They didn't admit to it. It ended up as a legal case and I had to refer him on to another surgeon who then was trying to sort him out. I know it's a bit dramatic this one, but it's just another illustration of why I just feel that it's so important to scrutinize the images. And just coming back to the, some of the earlier points..... .....We're Not here at all to try and slag anybody off or criticize anybody. And you're right. The radiographers and the radiologists are under immense pressure, especially in the NHS. They go through huge volumes and they do a great job, but it's really just a way to raise the awareness for us all that there can be loopholes and I just feel, as people who are potentially looking at scans and certainly referring for scans, we need to know that process. We need to know that our report going is so critical to inform that radiographer, to inform that radiologist. It's sometimes very easy to assume that, Oh, you know, they've got some thoracic pain and they'll just do whatever slices they need to do. You need to give them accurate information. But then when you get the scans back, and we are the ones who have got the time to really go through those scans, perhaps in a bit more detail than the radiographer and the radiologist. So I think if all three are working together in that way, and if we get a bit more training, a bit more awareness and preparedness and confidence to look at these scans, more of this stuff will be picked up and it'll just enhance people's clinical practice no end.
Darren Chandler:

Yeah, I think it should be taught really at degree level. We should have at least three to six months of basic training on how to understand images from X-ray, CT, and MRI really.
Steven:

Well we all know why that's never going to happen, because there isn't six months worth of space in the curriculums at the moment. So it's very hard to do that isn't it, without saying, well, okay, this is going to be part of your postgraduate qualifications. There's been a question that came in a moment ago from somebody, the're anonymous, but they're asking: - what is it you're actually requesting when you send in a request for an MRI? What are you specifying?
Darren Chandler:

Well basically, you're requesting whatever part of the body you're looking for. So if we're talking about spines, we're talking about a lumbar spine scan, and you don't have to put down T1, T2, axials. They're standard sequences. But one little tip I would give everyone is that, you know there's that massive talk in our industry about sacral iliac joints, and you know, do they, don't they? Well, like Rob says, always request the STIR sequence, whether it be shoulder, whatever, elbow. But If it's a lumbar spine, you can request an additional coronal STIR sequence. That's all you have to write. So lumbar spine MRI with additional coronal STIR. So what that means is, you get a STIR of the lumbar spine, you get a coronal of lumbar spine, but you also get the sacroiliac joints included. So we can see whether there's any pathological changes in the SIs along with lumbar spine.
Steven:

Well this one's the $50,000 question. There's lots and lots of people saying, - 'where do we learn more?' What are the reference texts that you would offer to people? And I'm pretty sure that you can offer some help yourself with people understanding MRIs and perhaps other imagery as well.
Rob Shanks:

Yeah. So to be honest, that's why we've put together the 'Go2imaging.com'. So we've got lots of little snippets and videos on there that people can go to. We're running some training courses, some webinarsseveral of which are for free. So people can get involved with us. They can learn from us. We're going to have guest speakers on there as well. And yeah, absolutely, we'd love to pass on some of this

knowledge and the experience we've been lucky enough to have on to others. Just go to 'Go2imaging.com' and it'll all be on there,

Darren Chandler:

You know Steven, we'd like to do MDT meetings really. You know, case history, you know, osteos, physios, chiros. They can share their scans and we can all sit and discuss and, you know, it'd be a great sort of way to interact.

Steven:

And I think, you know, it goes without saying really, that it's all very well reading a book or going to a webinar or something like that. But the only way to understand these properly is to see hundreds and hundreds of them, so you start to recognize the normal and therefore the abnormal.

Rob Shanks:

Yeah. Steven it's like learning to drive,isn't it? You're never going to learn to drive from a text book. You've just gotta get in the car and drive, you know, and that's the only way you're gonna do it.

Steven:

Yeah, absolutely. Rob, Darren, that's really kind of you. It's been brilliant, and I know, you could have gone on, which is why I skipped over a whole lot of slides at the end there to get to this one, which is your own URL, your own website and logo. And we've got a few more that are after this which we don't have time to go through, but we've had an hour of your time and an hour of the experience that you've gained from doing loads and loads and loads of this. Hopefully, a load of encouragement for osteopaths, chiropractors to get stuck in more so that we can become more expert in looking at these images. Because, like you said, I really think it's an oversight in our training that we don't really know what we're looking at until we've done additional work on this. But thank you for your time and hopefully we'll get you back in. Hopefully we can help you out in some way with getting the training outlets for people, because we'd love to do that obviously. Thank you. So that's it for now. Thank you guys.