Academy of PHYSICAL MEDICINE

Transcript

1R- Cauda Equina Syndrome: Recognition and Management with James Booth

Steven Bruce

I'm joined by zoom by remote link as always these days by James Booth, long standing colleague of mine, but James is an extremely knowledgeable osteopath who worked for eight years in the spinal Centre at the Queen's Medical Centre at Nottingham University. He has now spent the last two years acting as a triage consultant for the surgeons there. James welcome. I see. You're gonna put some more flesh on the bones of what you do well, but Nottingham at the moment sounds it sounds interesting and unusual for an osteopath. Yeah, so I work as an advanced clinical practitioner, spine practitioner with a group of spine surgeons who have a contract with the NHS as a spine surgery service. And essentially what they do is they take referrals from GPS, who are seeking a specialist opinion for patients with persistent spinal problems or acute spinal problems with worrying symptoms. And my role is to act as like a first triage so I tried to sift through those patients to identify the ones who will need surgery and so the spine then refer them on to the spine surgeons, or direct list them for surgery. And and if they don't require surgery, try and find a good way of managing that condition.

And what makes you uniquely qualified for this particular role.

James Booth

I'm sure I'm not uniquely qualified, there are more and more osteopath, physios chiropractors working in these roles. I think first of all, is probably having some experience working in an environment where you're getting advanced clinical knowledge, having an interest in an area. And then it's about opportunity. And as I say there are more and more of these opportunities coming up now where we can work in this, this advanced clinical roles.

Steven Bruce

And I presume that you were eight years at the spinal unit there at Queen's Medical Centre. I mean, you were working closely with the orthopaedic surgeons, the physiotherapy team and everybody else. So you know their language, you know, you've got a greater greater knowledge of surgery than most people will have in our professionals.

James Booth

Yeah, I guess working in a specialist spinal unit, you see a lot more surgical cases, you tend to see the patients who've exhausted community based care. So they tend to be the more serious end of the spinal pathology spectrum. So I guess when you're in that environment, you're seeing a lot more of a of the more serious cases and therefore you get a bit more experience of how to diagnose and assess patients.

Steven Bruce

You're always fairly modest, James, but I think we've now established your credibility as a speaker today to talk about quarter recliner. One of the reasons we're talking about it, of course, is because now that we're recommended not to do face to face consultations, we need to be able to screen out the important conditions. And one of the critical conditions listed by certainly by the Institute of osteopathy is called requirement. So where shall we start?

James Booth

Well, probably a little bit of background to court required. The court requirements were first identified in 1600 by Andres Azaria, so it's not a new thing.

But But as it as a syndrome in particular, it was described in 1934. So we've known about it for some time. Now. As we all know, the cord recliner provide innovation to the lower limbs, the sphincters, as well as sensory innovation to the saddle area, and parasympathetic, parasympathetic innervation to the bladder and the distal bowel. Clearly, the lower lumbar vertebrae are the most commonly involved because of the loading forces and the wear on the discs in those areas. So we know that approximately 57% of all court recording cases will occur at the level of L four, five, whereas 30% of L five s one and 13% of L three, four. So, you know, instantly if you know a patient has a disc bulge at L four, five your index of suspicion is slightly raised by the fact that you know that's the most commonly occurring level. In terms of the background to the cord recliner syndrome we know that it occurs as a consequence of the loss of function of two or more of the 18 nerve roots which comprise the cord requiring that the cord require nerves are particularly vulnerable as they have no Schwann cell cover. And there are some microvascular features of the quarter quarter system which leaves the area relatively hyper vascular. So again, those combined factors do make the quarter pointer nerves particularly vulnerable to compression. And research has shown that even mild even slight compression of the cord required can lead to mild theme myelination. So essentially cord recliner syndrome is considered a potential emergency within spine surgery, if there's an indication that the there is compression of the cord requirements,

Steven Bruce

you say that so there's actually some delta, whether it's an emergency and I've always assumed it was a clinical emergency and they need to be got to a spinal unit as quickly as possible.

James Booth

A cord recliner can syndrome as a condition is a surgical emergency by and large. I think the difficulty and the uncertainty is with the diagnosis. You know, I've certainly sat in meetings with a dozen spine surgeons looking at an MRI scan of a patient and and you get half a dozen different interpretations of whether it's called recliner syndrome or not. So, you know, I think that raises the point that it's, although imaging is incredibly useful, and ultimately is the gold standard for diagnosis, you need a clustering of symptoms and findings before you can arrive with that diagnosis. So, you know, how do you establish whether somebody has record require? Well, essentially, you have to consider the nature of their symptoms, you have to look at the chronicity, or the timescale of which their symptoms are developing or changing. There needs to be an aetiology, you need to have clear compression of the cord recliner. And as well as that, then you want to know that there is some sensory dysfunction. And then finally, you would confirm your diagnosis by by radiological confirmation. But it has to be a combination of careful history taking examination of the patients, and then your imaging, which allows you to make an early diagnosis so that you can you can treat and avoid that lifelong disability.

Steven Bruce

You gave us some topics there, including chronicity. What do you mean by that? I mean, is there a specific time length which you would be which would raise your antenna a little bit further?

James Booth

I'd certainly I guess it depends on the age of the patient, because I'll come on to this in a little bit. But we when we talk about older patients, very often they have bladder and bowel and things disturbance in sexual dysfunction. And so if that's something that's been going on for several months, and is fairly stable, then you wouldn't necessarily concern yourself too much. In regard to core requirements, if it were a younger person, and they have rapidly progressing neurological symptoms, particularly urinary symptoms, you that would definitely heighten your your sensitivity to a diagnosis of recliner. So I think it's about this the rate at which things are changing. If somebody came to me and complained of a two year history of bladder symptoms, you would not suspect code required is a rapidly developing condition in younger people under 50. And older people as we'll come on to in a while, it can be more of a slow grumbling type condition. And then you have to try and work out when you intervene rather than if you intervene.

Steven Bruce

I suppose when people come to particularly osteopaths, and chiropractors it's likely to be largely because they've got a back pain rather than because they've got those other symptoms. Is Back Pain going to be always present in quarter recliner syndrome.

James Booth

Not always present. But it's it's almost always. But I certainly wouldn't exclude somebody if they had all the other symptoms but didn't have back pain. I wouldn't kind of satisfy yourself that it's not called recliner. And I know certainly there was a study done in 2010 by Bala Subramania. Many Arnie, who looked at the number of patients who presented over a period of time with back pain and he included in his study 753 patients, all who had low back pain, and of those patients 14% had saddle anaesthesia. 28% had change in their bladder and bowel function. And 27% had changes in their bladder or bowel control that had changed with the onset of symptoms yet of all those 753 patients, only one of them had diagnosed cord recliner syndrome by the end of it. So you know having back pain doesn't necessarily mean that you're going to have cold recliner syndrome, even in the presence of those other symptoms. But not having back pain is not a reason to exclude cord recliner syndrome. Absolutely.

Steven Bruce

I should mention to those watching that you gave us some references there. James has got a fairly hefty slide pack, which we will make available after the presentation. It'll be on the recordings page as soon as we set that up. So lots of the data the details or statistics that James is coming out with will be available to you. We just haven't put them up on the screen behind me because we thought they wouldn't be terribly interesting to look at. Sorry, James interrupted you. Yeah, so

James Booth

diagnosis is challenging. It's difficult. Only 10% of suspected cord recliner patients are actually gone on to they go on to be confirmed. Using radio So even when the when you have enough indication to suspect to this chord require probably only one in 10 will actually be found to have the condition. And it's difficult because it's there's still no broadly accepted definition or diagnostic criteria for quarter Aquinas syndrome. It depends which studies you read where you take your information from. And very often as well as signs and symptoms can initially be quite subtle and vague. So it's a worry condition. We all are terrified of having a cord recliner present to our clinics, but reassure yourself that it's very rare in the community. And certainly, colleagues of mine you're working in spine surgery service and in the emergency departments would rather have a patient died and sent in with a potential diagnosis and be excluded on further investigation, then you think that you've may be making a bit of a mean of something and not sending somebody in so I think it's always better if you have good indication good clinical reasoning, to err on the side of caution.

Steven Bruce

I have some some experience myself and I've heard from others of referring people with in my instance what turned out to be a genuine cord recliner but but referring people and not being taken

seriously by the doctor getting hold of the letter. Have you got any guidance on you know, what are the terms we need to put in this does it does your average jobbing GP realise the significance of quarter Aquinas syndrome if you put it in a letter?

James Booth

Yes. I take most of my referrals in our spine surgery service from GPS and there are very, very few referral letters that don't allude to a presence of or the exclusion of cord recliner signs. So GPs are very hot on it. They know that it's a highly litigious area for the NHS, and they are very good at understanding the importance of recognising this the syndrome early design

Steven Bruce

is a highly litigious area for osteopath, chiropractors and physios as well. Yes, I think it is, we should be expected to spot this clearer. Definitely,

James Booth

definitely. There's no reason not to, to make an onward referral if there are sufficient signs and symptoms. And I think that's the point is that, you know, if there's enough index of suspicion, then you send your patients on for an expert opinion. And once the patient gets into a hospital setting, they have availability of radiological assessment as well as bladder scans, which are much more sensitive to diagnosis than the examination and history that we would take. Our audience

Steven Bruce

is getting the wind under sales at the moment now James, James so a couple of questions we can call required to cause a feeling of needing to urinate without any other problems neurologically, this person said they had a case of a young bodybuilder with no other dysfunction. back muscles are very tight. He wouldn't stop training but the orthopods in GP never came to a conclusion after referral could it have been psychological

James Booth

as I say you know a lot of patients who have back pain will also have some urinary symptoms but won't have cord require so that you know pain inhibition is one of the features of of the bladder being involved with back pain. So very often, patients who have back pain will experience pain inhibition, which means that they have a sense of needing to urinate but can't right but again it's it's about whether this is a developing neurology so if that's been going on for for three or four days, and they start to develop other symptoms, like painful return or painless retention, then you definitely should have been referring that question but it's difficult because the other thing I'm finding more and more is that a lot of patients are coming into the consultation now almost armed with some information because they've heard about cord recliner syndrome or they've heard about you will get a scan if you report having some lateral boughs things changes. So I think it's becoming

more difficult in the sense that patients are a little bit more savvy as to what to say in order to try and trigger the minimum criteria for an MRI of their spine.

Steven Bruce

And I imagine it's very difficult for any practitioner, osteopath, chiropractor, physio or GP knots to refer them if they've already raised that prospect because we terrified of being found to be wrong later on in the in the process. Yeah,

James Booth

yeah, that's right.

Steven Bruce

I got one from Monica here. It's about a 65 year old female with back pain only when load bearing urinary incontinence only when load bearing sciatica with numbness in one but sometimes both feet to the point of her falling a lot. Then the MRI says contacting the theaker but no compression

James Booth

Yeah, so this initially one because they can be a dynamic feature to nerve compression. But it's difficult to to make a definitive call without seeing the MRI scan but a lot of the

Steven Bruce

dynamic feature do you mean interaction is contacting her she's weight bearing but lying down in the scanner, it's not Yeah,

James Booth

yeah. But you wouldn't expect a big displacements in weight bearing compared to non weight bearing there may be a small increase and I was find that they're more of an issue with pyramidal impingement rather than central canal stenosis because you can have a small amount of bulge increased to a larger amount of bulge in the foramen which can become significant. But in the central canal, if you have a fairly capacious canal, you wouldn't expect to disperse, she's suddenly occupied a large proportion of that canal simply going from Norway parents or weightbearing. Okay, you know, it's difficult without seeing the MRI scan to be able to be clear about whether or not that's relevant. James,

Steven Bruce

I don't know if you're going to cover this later in your little presentation here. But what's the what's the outcome for a late diagnosis of a quarter equina compression. I mean, if you shave off,

James Booth

it's really important. You've got a critical window about 48 hours from the onset of cord recliner syndrome. And even then, even if people are surgically decompressed fairly rapidly, they're very often left with lifelong urinary symptoms, sexual dysfunction, and like back pain, so you know that the outcomes are not great when you get to them early, necessarily. But if they're better than if then undiagnosed, that's a hell

Steven Bruce

of a challenge, isn't it? Because actually, a patient might not come to us with their possibly back pain or possibly other symptom, they might not come to us for 24 hours, because they'll be hoping it'll go away. So we've got 24 hours to recognise this and refer them and get something done. Yeah.

James Booth

You've got 20 minutes to recognise it and get something done. Essentially, as soon as somebody comes into you, you should have a fairly good idea within 15 or 20 minutes of discussing with a patient and asking pertinent questions, to know whether this is somebody you're going to treat or whether you're going to refer them on. And

Steven Bruce

if you get in your mind, you have a positive diagnosis of cord recliner, or you're going to blue light on to the nearest a&e,

James Booth

I would direct into the nearest a&e, depending on how mobile they are. If they if they're able to get themselves there, I would encourage them to get themselves there. But if they are unable to mobilise because of the pain because of the symptoms, then you know, you could call an ambulance and No, no, no, no.

Steven Bruce

Okay. You carry on. I've got more questions coming in, but I'll let you have a word of your own first of all.

James Booth

Okay, so So, as we were covering off the provisional diagnosis of cord recliner syndrome requires that there's bladder and bowel sphincter dysfunction, that there may be sexual dysfunction and reduced sensation to the saddle area. But as I was saying earlier, a lot of patients who present with low back pain will also have some of these symptoms without having cord recliner syndrome. So it's a very difficult thing to diagnose. But we're looking for enough a clustering of information which gives you the kind of be the suggestion that you might want to refer this patient on and then it's about putting together a good referral letter that contains information indicating that you've done some assessment, what your your concerns are, and speak specifically about bladder or bowel sphincter disturbance, sexual dysfunction, saddle anaesthesia, neck pain, and the timeframe over which those those symptoms are developing. And mentioned, you know, be very clear that your concern is record recliner syndrome.

Steven Bruce

I think I told the patient I talked about earlier on. I sent a letter with him to the a&e department at St. Thomas's hospital. With all those things mentioned in it he was sent away with eyebrow from only to find himself in neurosurgery about two days later, I

James Booth

think. Yeah.

Steven Bruce

What's what's what's the, is there a common aetiology? In this? I mean, is it likely to be you know, the bodybuilder who's lifting heavy weights? Or could it just happen spontaneously,

James Booth

but it's a little bit like all disks really that you know, they come in with also sometimes they bend over to pick up a cup of tea. Sometimes they sneeze, sometimes they wake up with it. Sometimes it does come on after a heavy lifting, or heavy training type episode. But I certainly wouldn't as long as you have some sort of indication that this is a discogenic problem. That would be enough for me, I wouldn't want it to necessarily have to be somebody who's done some heavy lifting or some hard manual labour to include them in my my suspicion

Steven Bruce

during Parliament so so sent in a question which has just disappeared. Here it is. She says that she's hoping to help with the NHS doing MSK triage how much of this can be done over the telephone?

James Booth

I think a lot of it you know, I think if, to be perfectly honest, a lot of the information that you require in order to make a tentative provisional diagnosis a code requirement is simply based on on history and symptoms. Actual Physical examination Is is rarely necessary. And certainly in the circumstances in which we currently find ourselves, you should be able to make enough of a provisional diagnosis to refer somebody on following a telephone consultation,

Steven Bruce

which is, of course particularly important right now to a face to face consultation, which I suspect in some cases might actually aggravate the problem as well if they walk down the road to get to the practice or jump off a bus. Somebody's asked about diagnosing or triaging a teenager who also has a spondylolisthesis does that complicate the picture?

James Booth

It can do because you know a spondylolisthesis can cause it can cause narrowing of the central canal because of the slippage So, if you add a circumferential disc bulge to a spondylolisthesis, then then potentially there is a mechanism for for occupying the central canal and causing the cord require. And again, you know, teenagers tend to have a big clump discs. So, if the disc is going to bulge, there's plenty of material to extrude.

Steven Bruce

Just going back to cases where people have seen Lauren's have sent in an observation here that He said He said four cases of cord recliner over his practice to be sent directly to an end the other who preset presented with bilateral radiculopathy. We had a word with the GP but the GP disagreed with him. And so he wanted to send to the wanted to send them to physio, Lauren said he drove him directly to any himself. Yeah.

James Booth

Well, I mean, you know, I think sometimes we we find ourselves in situations where we have a strong inclination that things are not right. And we should follow that. That's your that's your experience and your judgement, and you shouldn't ignore it because somebody else is questioning it.

Steven Bruce

Yeah. And I'm glad I'm glad to hear that not everybody questions the guidance or the the judgement of an osteopathic chiropractor because Paul sent Him that He sent two patients to me with an accompanying letter. On both occasions, they were imaged with minimal weight. Fortunately, he says both were negative. But as you said, James, no one is going to complain if they've got the symptoms and signs then

James Booth

again, I certainly think if you are in an area that has a specialist, spinal unit or a specialist spinal service, they're more likely I don't have any evidence to suggest this but just from experience, they're more likely to to be taken seriously than if they ended up in a small Provincial Hospital where perhaps there wasn't a specialist spinal service and and yes, it's difficult, isn't it? Robin

Steven Bruce

Robin moody is asked if you're sending someone to a&e Would you send them with a letter? Or would you just tell them to say my osteopath, chiropractor physio suspects I might have quarter Aquinas syndrome and leave it at that? Personally,

James Booth

I would send a letter I am not sure. Unless you can speak to somebody in a&e, if you could speak to the on call spinal fellow or whoever is triaging in a&e triage and spines in NA, I would always send the letter because I think I think a letter helps to provide cogent information to the clinician who's having to make a decision there and then, but it also shows that you've gone through a process, you're not just packing somebody off, you've gone through a process yourself that has allowed you to arrive at a provisional diagnosis, I think isn't the it's a little bit more weighty if it comes in written format. And

Steven Bruce

on the other side of that particular equation is that if you've written this down, actually you are demonstrating at the subsequent subsequent court of inquiry that you did go through the right process, aren't you and you didn't just throw them out the window. And sometimes when

James Booth

you're writing an interest while you're sorry, when you're writing letters, sometimes it just helps to kind of clarify your own thoughts. So when you're putting down point by point while you're sending the patient, it gives you a clear framework in which your base on which you're basing your diagnosis. I think it can be useful to you as the referrer as well to the reason receiving.

Steven Bruce

Jones asked you to do a diagnosis for her. Well, this is in an opinion, she said a patient with a sudden onset bilateral low back pain groyne and testicular pain radiating into the penis. No other symptoms normal erectile function, the GP is refused to send him for an MRI, what do you think, would be the best course of action?

James Booth

So how long was what was the history how long?

Steven Bruce

So sudden onset bilateral low back groyne testicular pain

James Booth

so I'd be more concerned about testicular numbness rather than pain. So I guess you've you've got to think of your neurology in which which nerves are potentially involved in, in kind of genital pain. So yeah, I mean, as long as you're happy, that is not a pudendal type of nerve entrapment. And it's a low back thing. l four can very often refer pain into the groyne. It's so difficult to make diagnosis and things like that, but But it's certainly a growing testicle. The p&l pain wouldn't be high upon my index of suspicion for a cord recliner, particularly when it's unilateral load can you can get unilateral anaesthesia subtle anaesthesia. But I wouldn't, I wouldn't be overly concerned unless it was associated with some urinary symptoms as well as the pain. Okay,

Steven Bruce

I'll save some more. But there's lots of questions coming in. So I'll save them for a while because I know you want to get through some of the other information in your your presentation here. Yeah.

James Booth

So I guess the other thing that slightly complicates these patients with particularly with chronic back pain is that they're often taking medication. And the medication itself can produce some some symptoms which confound your diagnosis. So very often, patients taking opioids suffer with constipation, so when you start to ask them about bladder or bowel sphincter control, they'll complain that they're constipated. But again, you know, simple questioning about what medication they're taking. If they're taking opioids, then likely that's the cause for it. Similarly, a lot of patients these days with sciatic pain are prescribed your anticonvulsant medication like Gabapentin and pregabalin, and they can cause urinary incontinence. So, that's worth thinking about. And then a lot of patients with sciatic pain also prescribe drugs like amitriptyline or nortriptyline, and they can lead to urinary retention, as well as sexual dysfunction. So you can't just take absolute symptoms as an indication that something's going on, you have to think through the medications that we're taking as well. We also know that, particularly in older patients stress incontinence and urge incontinence are incredibly common. And in older males, prostate dysfunction, specifically benign prostatic hypertrophy. 30%, of 60 to 69 year olds suffer with this condition and 40% of 70 to 79 year olds. So, you know, having difficulty with initiating urine flow can be related to their BPH rather than necessarily be an indication of corporate climate. And again, we also know that erectile dysfunction is quite common in males with cardiovascular disease, so as high as 65% in patients with diagnosed cardiovascular disease, so again, it's worth understanding the background in terms of their coexisting conditions.

Steven Bruce

Would you like a few questions before we move on?

James Booth

Yes, let's go.

Steven Bruce

I'm kind of picking these at random at the moment. VSP has said kind of degenerative spondylolisthesis retro ICC has caused quarter coiner Is this a known aetiology in later age?

James Booth

So yes, we will touch on this in a little while because I think this is an interesting group, the older patient we're seeing more and more of them, particularly with central spot as to now canal stenosis. And retrolisthesis again is a factor that can narrow the central canal. And generally when you have a retrolisthesis, you get increased degenerative change in the the facet joints, so you get facet joints hypertrophy, as well as hypertrophy of the ligamentum flavum. So you get this kind of pincer movement of the the retro aesthetic, vertical segment moving posteriorly often with a circumferential disc bulge and then you get this the ligamentum flavum. And the facet joints coming in from from the posterior direction moving anterior, and so you get this squeezing of the canal. So yes, there is there is definitely a potential mechanism in older patients with those features. But the symptoms as we'll describe in a little while, tend to be more grumbling, slow burning type symptoms, not to be ignored, but certainly don't, don't suggest surgical emergency.

Steven Bruce

Okay. Diana's asked about information on spotting late or delayed onset quarter Aquinas syndrome.

James Booth

Well, the problem with when it gets that late is that you're generally in trouble. So the symptoms of a complete chord require is what we would call that late onset, or the patient would have painless urinary retention, complete lack of awareness of the need to avoid they often after time develop an overflowing consonant. So they start to dribble here and because of overflow, they may also have a erectile incontinence. And then in men, penile erection may still be achieved, but often not and we call absence ejaculation. So those are the kinds of features that you'd expect to see in an established or complete cord recliner. But you know, essentially by then the surgical window is gone and the horse is bolted.

Steven Bruce

And we did have another question that came in about you know, what's the success of surgery but you said after earlier on but after your 48 hour window, then the outcomes are looking gloomy.

James Booth

Yeah, they're not good. I mean, as I say, once you get to that, that's kind of complete cord recliner syndrome situation then In the surgical process is nothing more than a decompression, it doesn't do a great deal to reverse the symptoms because the nerve damage is done and it's permanent sadly. And as I say, even in those incomplete board recliners, very often, there's still components of residual neurological deficits after the surgery has been done.

Steven Bruce

Chris has asked about an update on anything more accurate in recent research than other than the stuff we've learned in the last 20 years. How much is how much have we learned in the recent years about quarter require that might refine the diagnostic process?

James Booth

I think one of the probably the one of the big advancements and it's not that recent is five or six years, at least old now is bladder scanning. So one of the tools that hospitals have available in some GPS habit is pre and post void scan. So scan the blood volume, pre urine urinating, and then post urinating. And if you retain 200 mils or more, then that's a strong indication of, of retention, and increases the strength of the mandate for for decompression. Is this an ultrasound scan? Is Yes, it's an ultrasound scan of the blood and yes, yeah. Okay. So that's probably a fairly big one. MRI imaging was or MRI imaging was probably the biggest advancement. So when you when you combine a good case history, a good examination, Mr. And a bladder scan, you can you can generally be pretty accurate about your diagnosis.

Steven Bruce

Okay. Is this was asked another question about this, is there a sort of a sequence of likely symptoms, which are the which are more likely to arise earlier than, than others, if any?

James Booth

Well, I would say bladder dysfunction is probably the strongest indication. This study by course, in 2013, they did a meta analysis of 15 study, so 460 Odd patients in total. And they found that bladder dysfunction was prevalent in nearly 280 9% of patients with quarter Aquinas syndrome at initial presentation. About 81% of patients had settled anaesthesia during that clinical during their first clinical presentation, and about 47% had bowel dysfunction, defecation dysfunction. So I'd say you know, if you if you had a patient who came in with bladder dysfunction, so either difficulty initiating or did or stopping or loss of sensation, avoiding the bladder, and some saddle anaesthesia, the alarm bells would be well and truly gone for me that there would be no doubt in my mind that I'd be sending that patient.

Steven Bruce

Okay, I'll let you carry on. And we'll come back to more questions later. Okay,

James Booth

so. So in terms of the dermatomes, we we've got that image up there. So s three, four, and five are the ones that you're looking at in terms of examining for saddle anaesthesia. Probably best not to do this unless you feel competent to do it, it's a very intimate examination. And unless it's going to change your diagnosis, I probably would avoid doing this because this is probably best done in a secondary care setting. So anal tone, and saddle anaesthesia or to the examinations that that we would do in a secondary care setting, but only really go down that road if you feel that it's within your scope of practice. So we've talked about complete versus incomplete and incomplete chord requirements are where you'd have this altered urinary sensation, loss of desire to avoid needing to strain in order to avoid increased frequency or urgency of blood avoiding and as I say, subtle anaesthesia in the unilateral bilateral lay would be strong indicators for me that you need to make a rapid referral. But when you go past that point, when you've got painless urinary retention, lack of an awareness of the needs avoid as well as the opening of the overflow of the bladder, and erectile incontinence and penile or penile Erection and ejaculation or loss. Then, as I say the horses bolted on that one. In terms of a study by end ng 2004. He looked at the symptoms of patients presenting with cord recliner. And as you can see from the slide that 86% of them have back pain so it's not absolutely certain that you will have back pain, but there's a pretty good chance perineal numbness, sciatica and loss of urinary sensation. You put all of those together, you cluster those together and you've got a pretty high degree of certainty that the patient is going to be A candidate for decompression surgery. The signs when we look at those bilateral loss of perineal sensation in just over half of patients, unilateral loss of perinatal sensation in about a third loss of ankle jerk reflex in about 40% of patients, and an absence at Autozone, nearly 40%. So, again, so you take your symptoms, you take your examination, you cluster all of those findings together. And that gives you your mandate to either refer or not. So this is the important part about asking your questions when you're taking your case histories, I think it's important to frame your questions carefully. Because we're going to be asking patients quite difficult questions about bladder or bowel sphincter control, which they often find embarrassing. And particularly when you haven't asked questions about sexual dysfunction, I think it's really important that the patient understands why you're asking these questions to simply launch into a, you know, have you experienced any erectile dysfunction without giving it some sort of context, you might find that you get less than satisfactory answers from people who are deciding that you're just being a bit nosy about their sexual function.

Steven Bruce

So just in just brought up the slide of symptoms there, rather than signs which you were talking about a moment ago, but I'm struck, just and if you bring up the one on signs, which is the next slide along in your carousel, what I'm struck with there is that, as you said, James, there's a lot of things that I wish we wouldn't generally do in an osteopath or Physiotherapy is physical or a chiropractic practice, you're looking at ain, or tone and perineal sensation and so on. Ankle jerk is probably the only one that we would commonly do. So you know, so against that person who said, Can we try this over the telephone? You pretty much couldn't do you wouldn't you wouldn't really rely on that one

sign. Thanks, Justin. Yeah. Going back to that I got a couple of other questions. Trevor said why is the nerve damage permanent when as he understands it, nerves do regenerate albeit very slowly. Well,

James Booth

because we talked about the the lack of Schwann cells in the cord required and the D myelination and once the nerves of D myelinated. Then, you know, they don't tend to recover, unfortunately. Okay,

Steven Bruce

Amazon asked about post surgery rehab, is there a role for us in that

James Booth

so this is something I don't know if Emma is a physio or stuff chiropractor, but certainly the physios do get quite involved in a post surgical rehab. I think very often with cord recliner patients, they have ongoing back pain, there's a lot of fear and anxiety as well about their their symptoms. There's a lot to be done in that regard to try and help people to, to enable and empower people again, because it's the kind of condition which leaves them terrified about what they can and can't do. So I think there is a role. I'd say the role is probably more in the physiotherapy domain than necessarily in the osteopathic and chiropractic domain. Although if you have experience of rehabbing post operative patients, or you have an interest in it, then potentially a symbol for us. Sure.

Steven Bruce

Elizabeth centre, an interesting one here from what I've quickly seen a bit she says she had a patient who were talking about why might they come to particularly osteopaths and chiropractors and she had a patient who'd had a riding accident, and had cord recliner symptoms with profound loss of sensation and muscle control in the medial upper and lower limb. She didn't have she didn't have a disabled bulge, but hematomas within the spinal canal, L three, two L five, because you actually came in due to knee pain, apparently.

James Booth

So she's had a bleed within the canal, apparently. And that's certainly outside of our scope of practice. I would be

Steven Bruce

referring that on Indeed, but the reason she came was for knee pain. So obviously, yes, yeah.

James Booth

I mean, we always have these horror stories, don't we have somebody who comes in with what seems like something we ought to be helping with? And it turns out to not be, but again, as long as you followed your good clinical reasoning and your good processes in terms of examination, and try to, to understand why the patient is presenting the the symptoms they are, then you know, I think that's okay, I have to say if somebody fell off a horse, I would be concerned anyway, if they're presented with any neurological deficit, because you're falling from a good enough heights, that there's a good mechanism of injury, I would probably be looking to have that patient scan anyway, if they had any neurological deficit after falling off a horse. Yeah,

Steven Bruce

and you'll know from the work you've done with me that when we do first aid training, we always emphasise if someone's come off a horse, you just have to assume spinal damage of some sort, until

James Booth

you've got good reason to know that it's not spinal damage, and that would be my assumption, particularly when they're presenting with with neurological symptoms and extremity symptoms. Have to do again. Yeah. So at that going back to the framing of your questions, I think it's important to, to help the patient understand why you're asking the questions what the relevance of their answers might be, and, and then go on to ask them the questions. But particularly, you need to explain the importance of the timeframe and the seriousness of the questions. Because chronology is critical. As I said earlier, you know, is this a changing picture in terms of bladder and bowel sphincter disturbance, saddle anaesthesia leg pain. And if it is a changing, rapidly deteriorating picture, the patient needs to understand the time sensitive nature of recliner syndrome. And very often, as part of your safety netting of patients, when you are seeing somebody who doesn't display necessarily cord recliner symptoms, but they've got a fairly large disk, particularly around four, five and five s one. And if you can see their imaging, that they've got quite a narrow canal, I think it's really important that people understand the importance of the questioning, you know, I often see patients who've been to their GP before they get to us, and you ask them questions about bladder and bowel sphincter control, and they say, Oh, yes, my GPS asked me that. And you said, what? Do you know why they're asking you? No, no idea. And I think if a patient understands that changes in bladder and bowel control, or saddle anaesthesia, is an indication of something potentially surgical emergency, they're much more likely to make note of it themselves and respond to it quickly, if we start to develop in English.

Steven Bruce

I got a quick administrative point for people. Claire tells me that she's had to direct a lot of people across directly to Vimeo. And they're concerned that they won't get certificates at the end of this class that she will make sure that we get their names via Facebook Messenger afterwards. And once we've got their names, we'll set them up with all of the necessary things to make sure the certificates happen. So don't worry about that. And if you did join us late because of difficulties logging in, then don't forget that this will be recorded, I'll get it up as soon as I possibly can. And you'll be able to catch up with anything that we covered earlier on in the broadcast. And that James is possibly where we had a couple of questions which reflected things we'd already answered.

James Booth

So, so when we're talking to our patients, and we're asking the questions, the sorts of things that we want to know, you know, are they experiencing the loss of feeling? Pins and Needles between their inner thighs or genitals? Have they had any numbness around their back passage or buttocks? So a question like, you know, when you want your bottom, can you feel the tissue paper is sometimes people do stop and think because they can actually relate to doing that rather than just asking them if they're experiencing and carrying on numbness?

Steven Bruce

I remember Nick Burch when we had him in one of the things he said he he refined that and said, Can you feel it? Can you feel equally on both sides? Which is another valid point?

James Booth

Absolutely, yeah. Because you can't get unilateral loss of sensation. So So definitely, you know, when you when you go to pass water, do you have any difficulty initiating passing water? Do you? Does it feel normal? Do you feel the sensation of passing urine? Have you noticed any leakage afterwards? Or are you starting to use pads? Question probably to women more than men? Do you have difficulty stopping or controlling your flow of urine? Do you know when your bladder is full? Do you know when it's empty? Do you have an ability to stop a bowel movements? Or is it just like a constant flow or leakage of faeces, any loss of sensation when you have a bowel movements and again, you know, not many of us think about when we go to the toilet, we don't think about the flow of urine or the passage of faeces because it's just such a normal thing. But when you don't feel it, it stands out. It does seem like an odd thing not to be able to feel the sensation. And then again, the question to men do you have any challenging issues with erection or ejaculation to women as well and in loss of sensation during sexual intercourse? And then the last one that's becoming more and more kind of relevant probably is the bilateral leg pain. If a patient presents with bilateral leg pain, that's important questions to ask them to establish with sometimes they'll tell you that they've got pain in one leg and then when you ask them about the other leg, they say, Well, now you mentioned that I do get pain that but it's not as bad as the right leg, for example. So it's always worth making sure that you've you've kind of ticked all of those boxes in video questioning.

Steven Bruce

This B has asked about saddle anaesthesia and he's phrased it as you know, our patients keyed in to the the idea of saddle anaesthesia. Do they really? Do they recognise it? Would they just normally dismiss it as being a fairly low value symptom?

James Booth

When I have come across it and you speak to patients and you say, when you wipe yourself with toilet paper, can you feel it? And they'll say well, no, but I didn't think that was relevant. And that

again is the importance of for qualifying while you're asking the questions if they understand the importance of the questions and the relevance of the answer, they're much more likely to pay notice to to their own sensations or lack of sensation. Okay. So in terms of

Steven Bruce

carry on back, no back to you the questions for now. Okay.

James Booth

In terms of clinical assessment, as I said earlier, it depends on your clinical setting. If you're working in a secondary care hospital, the type of assessment you're likely to do is very different to if you're working in, in a community based or private practice. But importantly, if you suspect then refer, don't sit there and wonder whether you're doing the right thing or not, you'd much rather get it wrong, and the patient not have it, then get it wrong, the patient habit. Only perform your PR examinations and your bladder scans if they're within your scope. And obviously you have the equipment. Make it clear if you have concerns regarding cord recliner syndrome and make it clear to the patient don't dither about and try and dress it up as as something not to worry about because patients generally don't get scared or alarmed by you giving them information. They are often more fearful if you don't give them the information because they then left wondering in you if you are sending on we talked about this earlier, make sure they have some, some supporting documentation, including that the relevant history. Obviously we don't have to talk about them growing up. But anything that's happened in the last couple of weeks, particularly significant changes include features of your neurological examination, including motor sensory reflexes, any long track signs and neural tension signs that sort of thing. And again, any any changes in the bladder or bowel control. The prognosis Well, it's kind of influenced by multiple factors really. aetiology can be affected the speed of onset, the duration of the compression, the degree of neurological deficit, the signs and symptoms and the spinal level are all factors that will determine the prognosis but the severity of bladder dysfunction at the time of surgery tends to be the key factor. In terms of prognostic indication, the more severe the bladder dysfunction at the time they get surgery, the worse the prognosis. The club begins at the onset of urinary or bow sphincter dysfunction. Cord recliner syndrome patients presenting to a&e only 19% of them will have bilateral sciatica, lower limb weakness, saddle anaesthesia sphincter disturbance so the patients who have called required to about a fifth of them will get there with relatively mild symptoms. So there's a really good opportunity to do something about it. And that's the importance of that that early diagnosis that surgical window is the science can sometimes be a little bit subtle. But those are the good ones to refer on because the you know if you catch them early with subtle signs the prognosis is really good.

Steven Bruce

Sevens asked us a question about the treatment for urinary problems with a chronic quarter recliner syndrome

James Booth

as in post cord recliner syndrome,

Steven Bruce

well, that isn't clear. And I just wonder whether that's what he's meant there whether it means after surgery,

James Booth

I mean, often often patients have to self categorise life afterwards because the can bladder control sphincter control is permanently damaged. So patients who are cared for who are postcode require now all self catheterized sadly,

Steven Bruce

and that's because it's neurological damage not muscle. There's no point in doing muscle coordination. Exactly. You

James Booth

can't do your your blood, your pelvic floor exercises or anything like that it there's no neurological control of the sphincter.

Steven Bruce

Diana says this might be an almost impossible question to answer I guess because she says how often after the presentation of a disc bulge is it possible for the symptoms to arise? I suppose it's almost impossible to know when a disc starts to bulge, isn't it?

James Booth

It is a little bit as I say, you know, it's a rare condition that that's Balasubramanian mafia Arnie paper that I quoted earlier 763 patients and only one of them so 763 patients with low back pain with all of those kind of seeming cord recliner type symptoms, only one of them actually had quarter corner. So it is a rare condition and your chat earlier. I think it was Lawrence you had for it his lifetime or Lawrence is pretty unlucky, I would say because, you know, there's quite a rare condition. So this goes on to become called requirements. It's difficult to answer but it's rare.

Steven Bruce

Robin's asked or mentioned that, you know he's always thought that this loss of sexual function question is a bit of a weird one. Those patients who present with symptoms that necessitate a cord

recliner screen usually are in a lot to pain he says, always feel that sexual activity is gonna be the last thing on their mind.

James Booth

You will be amazed. I'm constantly amazed that Pete You know people who who hobbling and who you wouldn't think could put their own shoes on. Sometimes they still managed to find a way. So, you know, I wouldn't make any presumptions on other people's behalfs about how sexually active they are. While in pain. I

Steven Bruce

do have an instance myself, it wasn't called a recliner, but it was a lumbar prolapse, of a patient who was in the middle of an act of sexual intercourse and suffered this prolapse, while prostrate on the floor and waiting for the ambulance managed to finish off the act. So as you say, it's not always the last thing on your mind, even when you're in severe pain.

James Booth

No, no. And you certainly don't want as part of your defence to say that I didn't ask any questions because I assumed that he was in too much pain to be having sex.

Steven Bruce

Another one, have you ever met an older male patient with urinary symptoms, which are incredibly similar to those a prostate, which has caught a coin? Or do the urinary symptoms always come with saddle anaesthesia?

James Booth

They don't always come with saddle anaesthesia. And again, if it's about the timescale of which the urinary symptoms are developing, so if it's an older male patient who suddenly develops urinary symptoms, so incontinence dribbling overflow, you know, don't question if they've got back pain and, and any other symptoms that go with it, and all the better. But if they suddenly develop urinary symptoms, I'd be wanting to know why. Because benign prostatic hypertrophy doesn't come on overnight, you know, comes in over years and years. This is

Steven Bruce

only laughing, though, because Claire says to tell you that we had five quarter Aquinas in one week in our clinic a few months ago. I don't know whether those were confirmed diagnosis. Claire hasn't told me but while I wasn't involved with them, that's a that's a federal number. Yes,

James Booth

well, again, given how rare they are. Yes, that's very, very unusual. So then what I was going to talk about coming back to that question that was just asked about older gentleman, I was going to talk about code requiring older patients because this is an interesting area and we see more and more patients with lumbar spinal stenosis. Now, because of the ageing population that we see. And because of the way spine services are set up, we're seeing a lot more patients with with the condition of central canal stenosis, and foraminal stenosis, and we know that the condition is primarily one of degenerative change. Between 45 and 60% of over 65 year olds will have MRI evidence of lumbar spine stenosis. The symptoms vary from mild intermittent leg discomfort to severe disabling pain and sensory motor dysfunction. And this is because there's kind of a transient ischemia of the cord require nerves by the combination of mechanical pressure, intramural route edoema, and venous congestion that occurs, but we know that bending forward in the majority of these patients tends to relieve that pressure. So that's why the symptoms can be quite transient and can elicit seated position patients can often be quite comfortable, it's often when they stand and start to walk that they develop the symptoms of neck pain, buttock pain, etc. So you can see

Steven Bruce

that someone called Charlotte Webb was asked whether you've mentioned if cord recliner is more common in particular age groups.

James Booth

Hello, Charlotte. It's different presentation. So under 50 year olds are more prone to having cord recliner because of a large disc bulge generally over the age of 50, that becomes less prevalent because of the degenerating discs. But then this group, this subgroup that we're about to talk about now become more relevant again because of the degenerative change in the spine which which can cause a you can see on that image behind you. So that's another four five it's not particularly impressive disc bulge. But then when you look at the the axial image to the side of it, you can see that the facet joints have hypertrophied

Steven Bruce

Justin can you bring that one up full screen please.

James Booth

Thank you. So you can see the facet joints have enlarged and so they start to encroach into the frame and as well as into the central canal and then that V shaped ligaments and flavour which should just be a thin line you can see there that started to hypertrophy as well. So you've got the facet joints enlarging you've got the ligaments and flavour and hypertrophy and then you've got this circumferential disc bulge and to get the pincer movement onto the onto the cord. So while the the disc bulge itself doesn't look all that impressive when you add the other two features from the posterior elements of the spine, you can see that the central canal narrows fairly significantly, and you've then got compression of the chord. Yeah. Thanks, Justin. So, you know this, this older group

of patients is an interesting one, because we're seeing more and more of them. So how do they differ from the younger cord recliner patients? Well, first and foremost, they're older, you don't tend to see those features very commonly in younger people. The canal is compromised by those features that we've just described. The symptoms in lumbar spinal stenosis tends to have this dynamic components. In other words, it's dependent on your posture. So bending forward tends to relieve the symptoms being upright load bearing in particular tends to worsen. The typical presentation would be of increasing low back pain generally bilateral with an insidious onset of either unilateral or bilateral low level, low limb sensory service. So patients often start to describe tingling pins and needles and numbness in either one or both legs. And they can it can be with motor weakness as well. So they can they can complain or observe motor weakness, or you may pick that up in examination. Sometimes they just say they're struggling to walk, they struggle to get up out of a chair. They struggle to climb the stairs. And then when you examine them, you notice there's some significant motor weakness, which is the reason for their difficulties and mobilising. So as well as the kind of neurogenic claudication symptoms these patients may also present with nocturnal leg cramps, they often want to get out of bed, Swing the legs over the side and sit up there too can start to develop bladder and bowel symptoms, as well as erectile dysfunction. So bladder symptoms are particularly common in this older age group. Particularly incomplete emptying hesitancy incontinence nocturia UTIs. And these are all important features of grumbling cord recliner. So it's really important to be specific, don't just ask an older patient, whether there have any bladder symptoms, be specific, you know, are they able to empty their bladder when they when they pass you? Do they experience hesitancy can they stop and start urinating quite easily? Have they had episodes of incontinence, and UTIs are an interesting feature. So again, they're a common thing in older people, but in the presence of back pain and lower limb union neurological symptoms, it would raise your index of suspicion. Very often these patients report these symptoms in a vague and inconsistent way. Because they are often transient, you know, they they're mechanically influenced by the position that the patient can be in. And so they often disregard them because then they're not a constant feature. And it's also it's also worth remembering that about 60% of over 70 year olds will have moderate to severe urinary symptoms with no cord recliner syndrome. So again, they're a challenging group, but they're not want to be ignored. And again, with this group, MRI is the gold standard. Sensitivity is high about 96%. But the specificity is not so high for diagnosing lumbar spine stenosis, so you can see it on the MRI. And I sometimes have clinics where I see the MRI of an older patient before I see the patient. And you can see that the canal is completely compromised, and the canal and the cord is compressed. And the patient wanders in with absolutely no symptoms at all. And the only reason they've come into clinic is because the GP send them off for an MRI. This is an incidental finding. And, you know, the patient gets packed off because the GP is anxious that the record is compressed. And in those patients, you don't do anything because they have no symptoms. And so you know, it's very much a condition that needs to be treated if you're symptomatic rather than just based on an MRI finding.

Steven Bruce

James asked for a bit of clarification on something you said earlier, James. She says Are you saying that if relief by flexion is present, then that rules out called recliner

James Booth

notice suggests that they probably have central canal stenosis, lumbar spine stenosis, you can't rule cord recliner out, if they have the symptoms of cord require even if by bending forward it relieves it because ultimately we have to get up and move around at some point. So if you have a patient who has no symptoms when they're sitting, but they do develop symptoms when they're standing, you know that patient is somebody who needs a surgical opinion because otherwise you consigning them to a lifetime of sitting. Which you know, it's not particularly healthy or fair. So if a patient has symptoms when they're weight bearing and particularly if they're developing and worsening than they should seek a search.

Steven Bruce

James, I think you're you're nearly at the end of your plan. Slides they're on Yeah, yeah. I've just done one follow up from Emma because she had some troubles accessing the broadcast she's just asked about post surgery protocols again for us run through what normally happens to somebody after surgery for quarter recliner. So it

James Booth

depends what the extent of their symptoms that post surgical symptoms are. If somebody is caught really early and they have a full recovery, then generally speaking, they would have some some physiotherapy immediately after surgery to help them to mobilise and to give them specific exercises to help strengthen and mobilise the spine. If there's somebody who has significant symptoms post surgery, then they would probably be under the care of a chord requiring a nurse who would help them with the likes of bladder and bowel function, so catheterization and such like and then generally they fall under the care of a pain management team as well. They very often end up having to have spinal cord stimulators inserted because of ongoing back and leg symptoms. So it's kind of the post operative care of chord require patients is very often secondary care, rather than community based care, unless they have some symptoms, which would kind of benefit from some physiotherapy or some osteo.

Steven Bruce

Given that we you know, we're now in a largely face to face free consultation process and everything has to be done via telephone or video, you got any sort of real points you want to emphasise before we close in terms of diagnosing and in terms of recognising these patients in good.

James Booth

I think certainly when I talk to patients on the telephone about back pain, if they have back pain, and it's a new back pain, or an old back pain that's developing, I would also always trying to establish whether there are discogenic features to their pain, whether there are leg symptoms, and if there are any of those I would start to clear them for cord recliner by asking about bladder and bowel sphincter disturbance, saddle anaesthesia sexual dysfunction as described earlier in the presentation. So you know, it takes two minutes to ask those questions. It's not it's not difficult, it's not embarrassing, it's not long question set of questions. So, you know, just whizzed through them

annotate that you've asked the questions and what the responses have been. And again, contextualise your questions make the patient understand what the relevance of those questions is. And that if anything should change you saved in I always saved in my lumbar disc patients record recliner syndrome because it's, you know, if they have that information, they can't go wrong.

Steven Bruce

What do you tell them to do? If they if they go away and they recognise or they see the onset of any of those symptoms you've described? What do you tell them to do to contact you again, or to go straight to any?

James Booth

I guess it depends on the patient. So if it's somebody who, who is fairly sensible, and displays a clear understanding of what you're telling them to do, I'd quite happily say to them, if anything changes, you know, if it's two o'clock in the morning, and you suddenly wake up and you're lying in a puddle of urine, you contact AMA, basically, if you're during the day, and you're not quite certain what's going on and you think something might be happening, contact me if you can't get ahold of me go to a&e, I think it's always good to safety net people with that reassurance that go to a&e, they're not going to be turned away, or they're not going to be treated as if they've imposed themselves on on the emergency department. Okay,

Steven Bruce

last question. I think your last question that's come in, it says so we have a grumbling quarter require in an elderly person treatment, non surgical, presumably, fastest injection to create hydraulic lift for hydraulic for more space or manual therapy, traction reinforced flexion should we pass these on to a GP? Or will they just get medicated sorry, that's I've read that as he came in to me, which is a bit disjointed.

James Booth

So So again, it's about the timeframe and the deteriorating nature of their condition. So if then your ology is deteriorating, if they're developing bladder and bowel symptoms, definitely refer them on. If they are somebody with a known lumbar spine stenosis, and you're just helping them to manage their symptoms, then that's fine. I'm not sure that facet joints do anything to create a hydraulic lift in the in the joints, that they're more a pain relieving injection, there's not a sufficient volume of injectate goes into the joints to create any kind of change to the children's space. So, you know, again, it all comes back down to you're questioning the chronology of the condition developing or emerging symptoms which which indicate cord recliner syndrome, regardless of the age of the patient.

Steven Bruce

And I said that was the last question I got one more I'm going to ask you could my team please please stop feeding me questions now because we run out of time on this. Sara Spencer Chapman has asked about a patient she had As with all the symptoms you describe of spinal stenosis, who's seen a neurologist who evidently has not communicated efficiently any sufficient any suggestions from you?

James Booth

So that's a little bit challenging, isn't it, I would try and gather some information from either the GP by way of a clinic letter, or try and get the patient to, to gather some information on your behalf. If a patient has all the symptoms, and they've seen a neurologist, I would like to feel reasonably confident that the neurologist has, has screened for court required and done the necessary investigations. But again, these things can change even in older patients, you know, they can be fine one day and the next day they can start to deteriorate. So any suspicion that things are going down the wrong road, I would, I would ask more questions.

Steven Bruce

Okay. Thanks, James. That's very helpful of you. And we've had lots of thank yous coming in for the presentation, because I think people recognise that you've probably got a lot more experience than many people in seeing

James Booth

this country, but not as much in Lawrence, he seems to be seeing more corporate clients in the local hospital. But

Steven Bruce

you're much more you're closer to the coalface and a lot of us in terms of what happens in surgical units and so on. So your expertise really, really valuable. Have you enjoyed that? Hope you found that beneficial, but that's it for today. Hopefully, I'll see you tomorrow. Thanks for joining