

Median Nerve Entrapment Neuropathy in the Forearm - Ref 284

with Simeon Niel-Asher & Dr Bob Gerwin

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TRANSCRIPT

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Steven Bruce

Good afternoon, welcome to my study where I sit and bask in glorious isolation with my positive Covid test sitting on the table next to me. It's a bit of a challenge for us, with me not being in the studio, cause it makes the technology a little bit more awkward to operate, but I'm sure you're gonna enjoy this afternoon show just the same, because I am joined by some very eminent people. Obviously, you know that, that's why you're here. I got Simeon Niel-Asher who is an osteopath, eminent in his own right as an osteopath. But he's also well known for his frozen shoulder treatment and the connected hip treatment, which is demonstrated on courses, but also for all the work that he's done on trigger points. Joining him though, he pales into insignificance next to Professor Bob Gerwin, who is a Professor of Neurology at John Hopkins in Baltimore. The two of them have run a course for us here in the UK, I think it was November last year, which was incredibly popular. It was such a good course. And we'll talk about that a little bit later. But today, we're going to be, well, I'm not sure what we're going to be talking about because I was told it was going to be anterior interosseous syndrome. And now it seems to have morphed into that plus all sorts of other things. Simeon, what are we gonna be talking about, and welcome.

Simeon Niel-Asher

Well, thank you very much. Well, thank you for inviting us. And it's always lovely to share the platform with Dr. Gerwin, I will tell you now, that is my guru. And when we did the course together, they say never work with children or animals on TV, and never work with your guru, because I always feel a bit nervous around him. Nevertheless, we're going to talk a little bit about trigger points and how they relate to sort of nerve, the relationship with nerve or sort of neurology. I think I was just going to introduce how I came to meet Bob and how I got into the whole sort of trigger points story. So I've been qualified 30 years now. So this in my second year university, I had the great fortune of working with, one of the professors took a shine to me. And he started to teach me about trigger points, which were fascinating. I didn't put a needle in them really, for many years until I met Bob. So this was sort of manual therapy of trigger points. And I remember we had a patient came to the clinic and I was so excited. I did this deep sort of myofascial release on her sort of iliotibial band, lateral guads, and she came back the next week black and blue, from her hip to her knee. And I thought, oh God, that isn't good. So I suddenly realised that actually, these trigger points, this deep myofascial stuff isn't quite so simple. And I refined my technique, I'm happy to say, no more bruises. And for many years, I was using manual techniques, really. I had the great fortune of going to one Dr. Gerwin's courses in the UK, but I didn't really talk to him very much. We sort of briefly spoke after; he was a little bit more austere in those days. And then he came to Israel, I have a clinic in Israel. And we ended up doing a workshop together and we've talked on workshops since and listen, when I saw the phenomenon that doctor Gerwin did of putting a needle in a trigger point. And you got to understand I'm pretty into trigger points. I've written books on them, and I've taught courses on them and you know, my whole shoulder technique's trigger point. When I saw that muscle twitch with the IMS, something just, I couldn't quite believe what was happening. I thought there's a whole system.

Steven Bruce

Let me interrupt you for a second, Simeon, because you said IMS. Intramuscular Stimulation. Yes?

Simeon Niel-Asher

Correct. Yeah. And again, we'll talk a little bit later about the difference. So I attended Dr. Gerwin's course. And then we ended up teaching together. And you know, I've ended up, so I started working on my sort of interactive 3d software. And I already had come quite a way forward. I remember we went for lunch, after one of the courses, I was very excited to show Bob what I was doing, and he loved it. And he said, listen, he said, could you put videos in it? I said that that's one of the plans. So we got our heads together, and we put up these very well recorded 4K videos in the software. So yeah, that's how I met Dr. Gerwin. And really, I'm very pleased to say we've worked really well together.

Steven Bruce

I tell you what, I don't think we need to pick up your credentials or Bob's, to be honest, because we apparently maxed out the server with people joining us for this particular webinar. Hopefully, that's all ironed out now. And everybody's got back into the system. But clearly, there are lots and lots of people who want to listen to the two of you. My initial question was, what are we talking about?

Simeon Niel-Asher

Thank you, yeah, that brings me to the subject. So Bob and I were talking about what we might share today. And I've been on a few of Bob's neurology conferences where he talked, very interesting about the relationship between nerve pain, nerve compression, myopathic compression, and we got thinking about the median nerve and some of those conditions. And Bob, being a neurologist has very interesting ideas about how the neurology and trigger points relate. So I'm gonna hand it over to Dr. Gerwin.

Bob Gerwin

Well, thank you both. It is a pleasure to join you, Simeon and Steven. It's interesting to eat to hear how different people came to have some familiarity and interest in myofascial trigger points. And in the whole concept of myofascial pain syndrome, and then added to what they've already known about the management of the variety of kinds of pain. And this is true with my own background as a, I would say an orthodox neurologist, practising regular neurological medicine, but being rather flummoxed by a number of different kinds of problems that classical neurology couldn't answer. I remember, one young lady with neck pain, had no idea what she had, I gave her some kind of treatment, which clearly didn't work. And it was years later that I found out that thinking back that she really had a myofascial trigger point problem in her sternocleidomastoid but at the time, I had not the faintest idea. I happen quite by accident to meet Janet Travell. And when I was introduced through her to the whole concept of myofascial pain syndromes that were very difficult to understand became understandable.

Steven Bruce

Bob, I'm hoping that nobody in who's watching needs to be told who Janet Travell is, but she's a...

Bob Gerwin

Sorry, I was going to talk a little bit more about her a little bit later. In brief, Janet Travell was President John F. Kennedy's White House physician. When she was in private practice, she was a professor at Cornell University Medical Centre in New York City. And she had an office for private practice, a walk down below street level office on 12th Street in Manhattan. And a friend of hers, a physician friend came in with a US senator who had not been able to attend the Senate meetings for seven months, John F. Kennedy hobbled into her office, and he walked out afterwards, and that began a long term friendship, she was invited down to the family compound in Florida to treat him. And when he was elected president

five years later, he asked her to be his White House physician. She was the first woman, White House physician and the first civilian White House physician, which did not make her beloved among the Admiralty, the traditionally medical care for the president was provided by the Naval medical staff, the admirals and the National Naval Medical Centre. But her name became well known because of that, she moved from New York to Washington. And I happen to meet her guite by accident because I happen to move across the street from a dentist, who was teaching about facial pain to a dentist and had asked Janet Travell to lecture to these people. And he asked me to join, and I met Janet Travell that way. And she became my mentor. And what I found was that there are a considerable number of neuromuscular syndromes and neurologic conditions, including migraine headache, and we can talk about this a little bit later, but migraine, radiculopathy, peripheral nerve disorders, that were either resistant to normal treatments, or difficult to understand and diagnose. And I very quickly saw from my contact with Dr. Travell, that the concept of myofascial trigger points, particularly the concept of referred pain from trigger points, was extraordinarily helpful in understanding these neuromuscular and chronic pain syndromes. We thought, Simeon and I talking about this, we thought that a good way to illustrate that relationship would be to talk about entrapment neuropathies and see the relationship of myofascial trigger points to entrapment neuropathies. And the reason for that relationship comes from the fact that myofascial trigger points exist in muscle that has developed an abnormality in which there is a well-defined, tight or taut band of muscle, we say a contracted band of muscle, but I think that's not true, I think it's adenomatous. But in any case, it's a hardened band within muscle that prevents the muscle from lengthening. But it also means that that muscle is shortened, and that muscle can constrict and compress other structures. And the one structure of course of interest to me as a neurologist is the compression of nerve. So, clearly, nerve entrapment can occur from a mass of any sort, whether it's a bony mass from arthritis or a tumourous mass, an inflammatory mass, but what is most common I think, is a constriction of the nerve by an overlying muscle. So, when considering nerve entrapments as an example of a relationship between myofascial pain trigger points and entrapment syndromes, the median nerve entrapment syndrome comes immediately to mind because carpal tunnel syndrome is the most common entrapment syndrome that we encounter. Carpal Tunnel Syndrome itself is not a median nerve entrapment by muscle, it's an entrapment in the carpal tunnel at the wrist where the median nerve passes under the flexor retinaculum, or carpal tunnel ligament in association with nine tendons to the muscles in the hand and the nerve which is rather superficial and is easily compressed when the tunnel becomes tight for a variety of reasons. Pregnancy which causes swelling, diabetes, hypothyroidism, a number of conditions, rheumatoid arthritis can all lead to compression of the median nerve at the wrist and the carpal tunnel. But the intriguing thing to me as I learned about myofascial trigger points and entrapment was the fact that you can have immediate nerve entrapment in the forearm as the nerve passes in close proximity through the two heads of the pronator teres muscle. And this presents a picture which can be mistaken for carpal tunnel syndrome. But it also, not infrequently, occurs in conjunction with a carpal tunnel syndrome. You can call it a double crush, if you want to use that terminology where the nerve is entrapped at two or more places, double crushed in two places. And it explained why some people who had carpal tunnel syndrome and were adequately treated for carpal tunnel syndrome never really cleared completely, still had symptoms. And that is because they had a median nerve entrapment, which was proximal, further up the arm, to the carpal tunnel or to the wrist. And that had been overlooked. And that was fascinating to me to discover that because that is something which is actually rather easily treated if you could identify the problem. And if you had some idea how to palpate muscle. So just very quickly, to show you some of the anatomy of what we're talking about. I'll show you a slide of the hand dermatomes because the first symptom of median nerve compression at the carpal tunnel is usually pain in the hand, in the wrist, and if it continues to get worse, the pain may go up the forearm into the shoulder. But there is a sensory abnormality, which is tingling initially, paraesthesias, abnormal sensations in the part of the hand which is innervated by the median nerve. And that is the thumb or part of the thumb, the index finger, the long finger and the radial half of the ring finger. So the localisation of the sensory abnormality is diagnostic for median nerve and separates that from the ulnar nerve, as you can see in this diagram.

Steven Bruce

It's just, I've always puzzled about this and having an eminent neurologist on the show is great because just how well defined are those dermatomes, we always draw them with nice distinct lines halfway down a finger and so on, but presumably there is variation between individuals?

Bob Gerwin

Oh, there's some cross innervation between the ulnar nerve and the median nerve, but that's actually rather rare. And from a practical point of view, when you actually identify sensory loss as opposed to paraesthesias, paraesthesias are not that well defined. But sensory loss is very well defined. And it is highly useful to take a pin and ask an individual if the pinprick is as sharp on the radial half of the ring finger compared to the ulnar half of the ring finger. That is an extraordinarily reliable test. And it's very simple to do. That really is very useful in identifying the sensory loss. The other feature in carpal tunnel syndrome in terms of sensory loss, and we'll repeat this we summarise this at the end of this presentation, but the innervation to the skin over the thenar eminence over the base of the thumb, the nerve for that does not go through the carpal tunnel so that in carpal tunnel syndrome, there is generally no sensory loss, in the thenar eminence the sensory loss is confined largely, half of it to the palmary surface of the thumb, to the index finger, long finger, radial half of the ring finger, and the distal portions of the dorsal surface of these affected fingers. So from a sensory point of view, you can pretty well identify abnormalities caused by compression of the sensory nerve, the sensory component of the median nerve as it goes through the wrist. Now, other features diagnostically speaking are to tap the nerve, if you tap an injured nerve with a percussion hammer, it reproduces, it induces the paraesthesias and pain. So you tap the volar surface of or the palmar surface, if you will of the wrist, a technique called a Tinel's sign, and you will get the reproduction of tingling electric shock into the fingers and local pain. And then if you bend the wrist, if I can show this you can bend the wrist, compressing the median nerve at the wrist, Phalen's sign, you hold that for 30 seconds or so and you induce tingling in the affected hand. So these are diagnostic signs that help you identify a median nerve compression at the wrist. There are other diagnostic studies, the most useful one is electro diagnostic testing, but the patients become symptomatic well before electro diagnostic testing can identify slowing of nerve conduction through the carpal tunnel. Now the interest in the pronator teres muscle comes because the median nerve passes between the two heads of the pronator teres muscle. So now the pronator teres muscle has a humeral head, which arises from the medial epicondyle of the humerus, and then inserts on the radius. The other head, the humeral head, by the way, is the largest head, they're more superficial, the deeper head of the pronator teres is the ulnar head which originates approximately on the ulnar bone, on the ulna, and then attaches to the radius just below the supinator muscle and then the humeral head attaches just below the ulnar head of the pronator teres muscle. So there are two muscles that are distinct that both have the function and you can see for yourself if you have fixed the ulna and the humerus and you contract the pronator teres muscle, you're going to roll the radial bone or the radius over and medially to the ulna. And you'll protonate

the forearm, the wrist and then the hand. So, in which the pronator teres is not the major pronator muscle, the pronator quadratus in the wrist is, but it is a potent assistant to the pronation of the forearm. But the main point here is that there are two heads, and there's a space between them. And the median nerve passes between the humeral head and the ulnar head of the pronator teres muscle and can be entrapped.

Simeon Niel-Asher

Steve has a question.

Bob Gerwin

Please.

Steven Bruce

Yeah, I'm sorry. I hate to interrupt your flow because it is fascinating stuff. And everybody gets absorbed by the detailed anatomy, which is hugely interesting. But ages ago, Trish sent in a question about dermatomes. And I wanted to put it to you before we move too far on from that. She said that she'd always thought the distal symptoms were more serious than proximal within a dermatome. Is that true?

Bob Gerwin

The distal symptom's more proximal, the hand doesn't have, you're talking about fingers and the palm. I think the paraesthesias, first of all, the dysesthesias and paraesthesias are much more typically found in the fingers, which are more active in terms of sensation in the palm of the hand in any case. Pain into the palm of the hand and into the fingers is a significant finding regardless. But I think that it's an interesting question, and I think worthwhile to make the point that the paraesthesias and dysesthesias are primarily found in the fingers. You don't expect them so much in the palm. But I think that when you're talking about sensory changes in the palm of the hand, again, you have to be aware when you're testing the hand, that the thenar eminence is innervated, the skin is innervated by a nerve that does not go through the carpal tunnel. However, that nerve to the hand actually is part of the median nerve as it goes between the two heads of the pronator teres muscle. So the pronator teres muscles can compress the median nerve when there is a trigger point either the ulnar or the humeral head, contracting the muscle in both heads for that matter, and narrowing that space and so that when you then activate the muscle and bulk up that muscle by protonating the forearm, the median nerve becomes compressed repeatedly. If you're doing an activity for example, like turning a screwdriver, or repeatedly turning pages in a book or a manual so that your hand is, the forearm is repeatedly protonated and then you get symptoms of pain usually in the volar surface of the forearm, down into the hand and into the fingers. If the compression of the nerve, the median nerve in the wrist goes on long enough and is severe enough, you will get weakness of muscles particularly of the flexor pollicis brevis, that's the flexor the short flexor of the thumb and the opponens pollicis, so that the test for this weakness is to attempt to touch the tip of the thumb to the tip of the small finger and then you can, the examiner can run, can pull their index finger through that circle. And if there's weakness in these muscles, you will find that the thumb and middle finger can be easily separated. Normally it's difficult to do. When there is compression of the median nerve, as it passes through the pronator muscle and that compression continues long enough and is severe enough to actually develop nerve impairment, you get the same symptoms as you would in carpal tunnel syndrome, but then you get additional one, because the nerve fibres that are involved are the same fibres that go through the carpal tunnel, but there are also the fibres that do not go through the carpal tunnel, so that you get involvement

of the nerves to the muscles, the flexor muscles in the forearm, the deep flexors of the fingers and the superficial flexors of the fingers. So that the flexor digitorum become weak so that you cannot flex the distal joints in the fingers. And this leads to an inability, as we can see in this slide. Here we have an inability of making an okay sign because you can't flex the distal phalanxes of the index finger when you have a pronator teres induced muscle weakness.

Steven Bruce

Have you seen anterior interosseous syndrome often, Bob?

Bob Gerwin

Well, you know, it's interesting, the carpal tunnel syndrome occurs at some time in one's life in roughly 10% of the population, so one in 10 will have at some point in their life, symptoms of carpal tunnel syndrome. Pronator Teres syndrome is much less common. The statistics on that are much harder to come by. I've seen it said anywhere from 1/5, 1/10 up to as many as one half of people with carpal tunnel have a pronator. I think it's much more likely to be somewhere maybe 20% of people with carpal tunnel syndrome may have a coexistent pronator syndrome. You can also get pronator syndrome on its own. The statistics, the prevalence is much harder to identify because the syndrome is not identified as often so, the best statistics actually come from people who've looked for pronator syndrome and people with carpal tunnel syndrome and in some studies it's as high as 50%. But by and large, it's lower than that. Then there is a syndrome involving the forearm muscles alone, giving weakness to the flexor muscles of the fingers. And that's the anterior interosseous nerve syndrome, which at one time was thought to be a nerve entrapment syndrome by muscle. The pronator teres muscle can entrap that, the anterior interosseous nerve leaves the main body, the median nerve below or distal to the pronator teres muscle but recent thinking suggests that by and large, the majority of cases of anterior interosseous nerve syndrome arise because of an autoimmune disorder. A variant of Parsonage-Turner Syndrome with the involvement in the brachial plexus rather than in the forearm. Although I think there are likely to be some cases such as the one that Simeon has told me about, in which the anterior interosseous nerve was selectively involved as it went through the pronator teres muscle.

Steven Bruce

Based on what you've said there, Lauren sent in a question, saying that he's seen patients in the past who've been diagnosed with carpal tunnel syndrome by nerve conduction tests, but Tinel's sign was negative, does that suggest that maybe it wasn't the carpal tunnel at all?

Bob Gerwin

Well, if you do a proper electrodiagnostic study and show that there is a normal conduction time in the median nerve proximal, both motor and sensory, proximal to the carpal tunnel, there's a delay through the carpal tunnel, then I would say that that has to be carpal tunnel syndrome. If you do a median nerve conduction velocity test and you stimulate the nerve above the median nerve, above the elbow, then you do it below the pronator teres muscle and then you do it across the wrist, then you can do a differential diagnosis and it takes more time, more difficult. The clinical symptoms clearly come before you can identify slowing in electro diagnostic tests of nerve conduction velocity. So the patient complained of symptoms is actually more precise than electro diagnostic testing, a failure to obtain a Tinel sign, I don't know if that is *audio problems*. It's a gross physical sign. I think there may be

variations, you may not be hitting squarely over the median nerve. Buy and large I think patient's clinical symptoms are evident before any of these diagnostic signs can be elicited. So I put together a chart here by the way, the top of the line is the top series of three x's is carpal tunnel, the middle with all the x's is the pronator teres and the bottom is the anterior interosseous and across the top we have, we have pain, we have the sensory loss in the thenar eminence which is only found in the pronator teres syndrome because the anteriour interosseous nerve is only muscular and not sensory, the carpal tunnel syndrome as a sensory loss in the fingers and in the radial half of the index finger is indicated, pronator teres has that but also has the sensory loss in the thenar eminence of the hand. The last column, the last vertical column has the motor loss in the opponens pollicis. And then the abductor pollicis brevis which is those muscles required in order to bring the thumb around, so the tip of the thumb can touch the tip of the little finger and that you find in the carpal tunnel syndrome but you also find that in pronator Teres syndrome, because the pronator teres syndrome has basically everything on physical finding that you get in the anterior interosseous nerve and carpal tunnel syndrome, what the first vertical column has is the fact that the carpal tunnel syndrome pain complaint is largely nocturnal. So people with carpal tunnel syndrome complain of pain in their wrists, their hand and their fingers at night. People with pronator teres syndrome and anterior interosseous nerve syndrome generally complain of pain, this is the second vertical column, complain of pain during the daytime. And that is a useful clinical historical bit of evidence which helps direct us. So what this chart is an attempt to do is to help you separate pronator Teres from carpal tunnel syndrome, and anterior interosseous nerve syndrome. So the point I think that Simeon and I want to make from this is that myofascial pain syndrome can, indeed, lead to nerve entrapments that mimic other neuromuscular nerve conditions. And if you learn how to palpate muscle and you learn how to treat this with trigger point, dry needling, for example, that allows one to quickly treat these, the treatment is both diagnostic because it tells you that you're right in your diagnosis. And it's curative. So, Simeon, you found this to be useful in your practice?

Simeon Niel-Asher

Totally. Thank you, Bob. I mean, brilliant. You know, one of the things that I've seen a lot, obviously, is this mobile phone use, people playing games and using their mobile phone and holding it up, you know, pronating and supinating, all the time. And I'm seeing more of that. I've certainly recently had a patient with a pronator teres syndrome, which responded beautifully to the needling, I think, Steven, what's really important is that, and one of the things that, you know, we're keen on in terms of education is really being able to identify the anatomy to a very precise level, being able to identify the taut band. And I think, you know, one of the great things with hands-on physical therapists, is that we're able to fill these tight bands. I'm sure Bob will agree and when we train MDs, they haven't got the palpatory skills. So in some ways, trigger points are one of the few platforms where an osteopath and a neurologist can sit together and a physical therapist and actually have a conversation about these things. And as you can see, with the Dr. Gerwin's knowledge base, that he's come to the whole trigger point story through that neurology setting and I've come to it through the osteopathic setting. And we can have that conversation together.

Bob Gerwin

Yeah. My best teachers were physical therapist, osteopaths and manual therapists who knew how to palpate, and you are quite right that allopathic physicians do not know well, how to palpate, and certainly do not know how to palpate muscle.

Simeon Niel-Asher

Yeah, palpation, when we work with the doctors is not an active process, you know, it's not about doing it's about feeling. But sorry, over to you, Steve.

Steven Bruce

I was just gonna say Simeon, the knowledge of anatomy is really refreshing to see that in what Bob was just explaining. Just you've got very little time. I've got three minutes left. The app that you've developed, as far as I recall, gives us a good introduction, an illustration of that, does it not?

Simeon Niel-Asher

Yeah, well, I think the thing is that what we've demonstrated already is that you know, this is a complex subject. And when you come on the courses, especially with the needling, and again, Steven, when we talked about doing a needling course, together, Steven said, oh, we've had a few needling courses, what's different about yours? And I think it's true to say when we finished our needling course, you said this is nothing like what we've done before. And I think the point is, there is no, we think this is the gold standard. This is needling done by a neurologist, who was head of pain medicine, if you don't mind me saying so in Johns Hopkins for years. And this is a very different approach. And when you leave these courses, when you qualify with these needling techniques, it's very easy to forget what they are. These are complicated things. So we've developed this app together so that when you leave the course you've basically got Bob in your pocket.

Steven Bruce

Yes.

Bob Gerwin

Do you have that video that shows us the app?

Simeon Niel-Asher

I can just, maybe I'll just do a quick share. I'll see if I can.

Steven Bruce

You got one minute, Simeon. I know that you take quite a while with this.

Bob Gerwin

Do you have any other questions, Steven?

Steven Bruce

Yeah, we've got a couple of questions, which I think I'll have to send you outside of this and I'll feed them back to the audience in my email afterwards.

Bob Gerwin

Okay.

Steven Bruce

Simeon's got a video of the app briefly showing there on his screen. Yeah, well, I can share a video of the app in the follow up email. The one thing that we ought to point out to people is that for all the reasons you've just explained, we have got you and Doctor Gerwin back over here on the 19th, 20th and 21st, of May to run another needling course, Intramuscular Stimulation course, and the details of that, there should be a short code up on the screen while I'm talking. But I will certainly send it out in the email that follows this broadcast. But you know, I was more or less I was an observer on the last course. And it was streets ahead of any of the courses that I've been on before, that we run before and that I've heard about from others. And the feedback from everybody on that course, was just fantastic. You know, people coming back to me afterwards saying how it had been a real revelation using the techniques that you've described.

Simeon Niel-Asher

Trigger points are a game changer and knowing how to use them, you know, just to finish on this point, which, as an osteopath, we have a limited toolbox, and knowing how to use IMS, not only is it an efficiency in terms of treating and actually delivering treatment, and efficiency in terms of symptom relief, but it's a fabulous tool for the box.

Steven Bruce

Well, I mean, we've got to finish now. And I'm sorry, it's fantastic that you've got so much to share. And it's nice to leave people wanting more, I suppose. We had 334 people watching, but that's only the ones that are tagged because we had the login problems at the beginning because your popularity overwhelmed our servers. There are lots of other people. So, the total numbers I don't yet know. But hopefully there'll be a lot of those who want to see more of you when you come back in May. Simeon, it's fantastic. Thank you for joining us from Tel Aviv. Dr. Bob, thank you for joining us from Baltimore. And I'm looking forward to seeing you back over here in May because I think that'll be good. And it's very nice that you're sending your granddaughter to Cambridge to get some proper training as well. Thanks. I only leave you the audience with one more side update that is the next Tuesday the 14th, Valentine's Day I've got Matt Waldman in the studio, we'll be talking about middle crossed syndrome. And there'll be lots and lots of fantastic anatomical physiological rehabilitational stuff from Matt Walden. He's a fantastic speaker, great demonstrations. I look forward to seeing you there. That's it for today. Good afternoon.