

Orthotics and Cerebral Palsy - Ref 101SW - Draft Transcript

with Sam Walmsley

24th September 2020

TRANSCRIPT

Please note, this is not a verbatim transcript:

- Some elements (repetition or time-sensitive material for example) may have been removed*
- In some cases, related material may have been grouped out of chronological sequence.*
- The text may have been altered slightly for clarity.*
- Capitalisation and punctuation may be erratic...*
- There may be errors in transcription. If something appears odd, please refer to the recording itself (and let us know, so that we can correct the text!)*

Steven Bruce

Good afternoon and welcome to another lunchtime learning session with the Academy of physical medicine. My guest today is a gentleman called Sam Walmsley and Sam graduated in prosthetics and orthotics some 19 years ago from Salford University. But 15 years ago, he founded the London orthotics consultancy, which he's been with us ever since. And he's got a load of really interesting specialisations, but in particular, he specialises in paediatric orthotics. And today, we're going to be talking about the role of orthotics in treating cerebral palsy. So I'm great to have you with us. great pleasure. And it looks like you're joining us from your gait lab. Is that right?

Sam Walmsley

That's right. Yeah. Nice to see you soon. And you too. I mean, I'd

Steven Bruce

love to. I wish we had time today to talk about all those other things. I mean, one of your specialisations, quite sort of distant from the orthotics world is pectus, excavatum. And carenado, isn't it? which perhaps we can get you back on to talk about on another occasion?

Sam Walmsley

Yeah, we, we do specialise in that, but there's a very good orthotic solution for it. That's why so yeah, I'd be more than happy to come back talk about it.

Steven Bruce

Okay, so this is perhaps a bit of a leap of imagination for some people, the idea that, you know, orthotics has a role in treating cerebral palsy. Do you want to talk to us, first of all about cramps, what we mean by cerebral palsy, what the types are?

Sam Walmsley

Yeah, sure. So cerebral palsy describes a range of conditions caused by a brain injury that happens during the brain's development at the point of birth, or very soon after birth, and classically, it's split into different categories, described a spastic cerebral palsy, which then can be sub categorised by the area of the body, it affects either one diplegia hemiplegia, being one part of the body diplegia being normally the lower part of the body, or quadriplegia, the whole body dyskinetic cerebral palsy can be split into athetoid and dystonic. But typically, it describes slow rising, uncontrolled movements, and generally affects the whole body, or textia kind of sect, death, depth perception and balance. So I should

Steven Bruce

enter this stage, someone just explained to our audience that these slides will all be available as a download after the broadcast. And some of them will possibly be quite hard to read on a small screen, because they're quite complicated. So don't worry about it. If they can't read the slides in detail. In this case, they are already loaded up to the website ready to go. So sorry. There's also some, there's also wonderful resources on cerebral palsy. It's a very common condition out there. So you know, there are lots of support groups, both here in the US with live with lots of great information on you know, that, you know, the incidence of cerebral palsy.

Sam Walmsley

I think I think in this I'll be shut down and get this wrong, but I think it's one in 50,000 births. I'd have to look that up. Yeah. So when we when we talk about the different types of cerebral palsy, it's actually the area of the brain that's affected that causes these different presentations. And by far the most common presentation that we see is spastic cerebral palsy, with which is characterised by stiff muscles, basically, so spasticity within the muscles, so, but then the different other different types are much rarer to see. But you will see them in clinic, and they just affect different areas of the brain caused by the original brain damage.

Steven Bruce

Okay, are they easy to easy to recognise in, in a patient? Presumably?

Sam Walmsley

Yeah, yeah. I mean, once you once you become familiar with perhaps a gait pattern, or when when a child a little bit younger, the movement pattern a child presents with it is easy to recognise. Yeah. So especially, I mean, the dyskinetic dyskinetic types of cerebral palsy are quite easy to recognise in it because of the movements in there quite involuntary movements that are occurring.

Steven Bruce

And when we spoke on the phone a few days ago, you you mentioned this thing called SDR to me, I didn't watch that involved.

Sam Walmsley

Well, I think this is this is probably important to mention, because a lot of the spastic diplegic type which is a very common presentation to see in clinic and some of that hemiplegia, they are going for something called str which is selective dorsal rhizotomy, which is when a neurosurgeon opens up part of the spine, find some of the sensory nerves and selectively cuts those depending on which sensory nerves are overactive and causing some of the spasticity in the lower limbs. It's been around for quite a while I think it has been applied in pioneered in places like Austria, which but more recently, a place in America St. Louis has really pushed it very aggressively across the world in some respects, and then our own hospitals, but Ormond Street leads all day they and Bristol, they've all picked it up, and they've run their own programmes. And it's now it's gone through trials and testing. And now it's part of the treatment process. It's a, it's quite an aggressive procedure, there's no turning back from it. There are some downsides to it in terms of muscle weakness, instability around joints, which will probably be very important for your some of your members

to consider. But it's important to mention because a lot of patients are going for or perhaps will go for at some point. And, and it does mean that a patient who presents as a spastic diplegic diagnosis who's had a CR now has a completely different presentation, because a lot of the stiffness has gone. But they have a different set of problems to deal with. It's it puts you on a perhaps a different path for rehabilitation. And that path, hopefully most of the time is a is a better path, you can get to a better place. But it does mean it doesn't mean there's any less work involved or any less treatment involved. It just means that the a lot of the spasticity hopefully has left.

Steven Bruce

Do you know the general success rate for that operation?

Sam Walmsley

Well, I think these things are slightly debatable. I mean, if you if you most SDRs are considered successful. That's what my reading into it. But you know, we've had patients who perhaps they haven't been as successful as they wished. And also, I think sometimes some of the perceived goals of the surgery are maybe not met, maybe. So especially early days with a lot of the STI a lot of patients didn't, you know, thought they were not going to have to wear orthotics in the future. And I think that was perhaps a bit misconceived. And, but, but on the whole, I think parents are very pleased that they've gone for the surgery, and advice, and but they are confronted with different problems along the way. So I think it's early days, to be quite honest. I mean, we need to see some of these children when they're 20 and 30, to really see, you know, that's the real success of the surgery. Yeah.

Steven Bruce

You've also given us this ICF assessment here, do we need to know about this, it's quite a complicated little diagram. And

Sam Walmsley

it is complicated, but it's really important for how we, as orthotists should be looking at our patients, because a lot of the time I think we get, you know, tarred with the brush that we you know, you fit pair a hose, and you're just worried about how the patient, you know, walks in, in a gait lab environment. But actually, when we're looking at this is the International Classification of function. And we're looking at all of the ways in which a patient all the different areas of patient operates. So, of course, probably the most important thing to us are the bones and joints and protecting them. That's, that's paramount. Because if we don't do that as an orthotist, if we don't support the foot and ankle, if we don't, if we don't protect the knee and the hip, then that's going to result in bony surgery, which, you know, you know, orthopaedic surgery can be very successful, but there's also lots of risks, and it can take children off their feet altogether. So it's important that we do our best to try and reduce the incidence of some of these major interventions. But then we're also looking at function. And and I think, a lot of the time, again, orthotics, maybe get well, you know, they can stand up straight, but they can't play with their friends. Well, you know, sometimes we have to take a pragmatic approach to some of our prescriptions, so that we're, we're saying, Yeah, well, you take off for playing football with your friends, and you put it back on, again for walking around the classroom.

So there's lots of different ways that we assess our patients, but we try and funnel it through this system so that we're setting goals that a patient will come and see us and we set goals around these areas to make sure that we're we're achieving those goals.

Steven Bruce

Now. So is this a chart? Is this an assessment used in order to establish goals in each of those many areas that are listed there? Or is it an a chart to assess the degree of impairment?

Sam Walmsley

Now it's a chart to assess goals. Yeah. So from this, we're asking the patients and what's important to you, so that you know that a patient often is going to come in and they're going to say, Well, my child is going to go to school in September, and I want them to go walk around the classroom. That's a really common one. And and so we'll be looking at Yes, that's really important, we need to help us function and participation that we need to help with. But also, you know, if we don't do something the foots at risk of complete collapse, the knee is hyperextending, or the knees of Charles falling to crouch. So we've actually got we're actually really focusing on some of the body structures and function. And maybe we're setting goals around range of movement at the hip or the knee, whereas the parent met and it wants us to also set goals around their participation in school. So it just helps us all frame these goals correctly. And and measure it when the patient He comes back for review.

Steven Bruce

Right? And obviously, you talked a lot about the patient's parents giving you the information. What's, what's the oldest patients that you generally see in regards to cerebral palsy?

Sam Walmsley

70. So we see, we see adult patients with cerebral palsy, yeah, I've got, I've got a number of adult patients that have, you know, very complex gait patterns because of their poor walking over the years. And so we, you know, we will see patients all the way through those, there tends to be and, you know, most parents with cerebral palsy, with children cerebral palsy who have gone through their school, and now an adult will tell you about falling off the cliff. And it does happen, the paediatric services are generally good, that or at least they're very responsive. And then you get into adult services in bonus, there's not a lot there for the paid parents and, and children. So we do see a lot of adult patients as well who who seek out help and and are looking for something, you know, bespoke.

Steven Bruce

And the world must become quite challenging for an adult patient. Because of course, one of the challenges they have is is communication, and finding their way around, what's available to them and talking to related healthcare officials must be quite difficult.

Sam Walmsley

I think, I think, yeah, we're, we're always struggling, I've got a really charming patient from Bristol, who, though he, you know, he has communication difficulties he has, he's in a wheelchair, most of the time, he uses his efos for transfers and small movements around his office. But he didn't think twice about getting on a train in Bristol, coming to getting onto Paddington and coming to Kingston upon Thames, by himself. I mean, and so actually, a lot of the time whilst those are perhaps, and that's the one of the things you learn as clinician when you deal with CP, their perceived problems. They are, you're dealing with very, very capable driven people to get things done. So yeah.

Steven Bruce

And I accept that, and I and it must be really must be doubly frustrating, because you know, they can think very clearly, but communication can sometimes be So, so challenging.

Sam Walmsley

Yeah, exactly. Yeah, it is one of the challenges about any of the consultations that we do sometimes

Steven Bruce

Yeah. And I said that last diagram was quite complicated. This one is, there's no way this one's going to come out well on a small screen, but it'll be part of the handout. This presumably gives us a schematic that you would use in terms of working out what you're going to prescribe.

Sam Walmsley

No one really needs to memorise this or know this, don't worry, this this this is this is something that is taught to all the tests at a quite an early stage at graduate level now. And that has been developed by a physiotherapist called Elena in who you will see within my references is the main person who's who's done most of the good research on how to build and design a pose. But what it tells us is it importantly is that there is an algorithm for designing and a foe And importantly, footwear, as well, because an fo splints should not be supplied by itself, it should be supplied with a shoe to go with it. Because if we if you're putting a splint with a fixed ankle, or even a hinged ankle on on the ground, what you do to the shoe then influences the biomechanics of that process. And there is a clear algorithm on how this should be done. And I think that that's often lost a lot of the time, it's it's sometimes considered a bit of an art this process, but actually there is science behind it. And it's it's well evidenced, it's it works. But as you can see, there are huge processes there. And the problem when you've got a process driven situation is that you have one of those processes goes wrong, and then later down the line, it's not working. And so some of the some of the perhaps the reputation that these things get is that they don't work or it's not working or that that's that's that way in which we prescribe orthotics isn't working. But actually it's because one of those processes and done correctly a bit in the initial assessment bit maybe in setting the goals, you know, if you get the goals and expectations wrong, but often it's the casting process or the or the manufacturing or the orthotics themselves, where this where it doesn't go quite right. So it's a really it's a difficult thing to produce to deliver results, but there are lots of guidance on how to do it correctly.

Steven Bruce

One thing I perhaps ought to clear out here is you're using terminology, which is commonplace to you, but you might want to explain what an LFO is to the audience.

Sam Walmsley

Sorry, yeah. Ankle foot orthosis. So, and so we tend to describe orthotics by the joints that they act upon. So an ankle foot versus obviously controls the ankle movement and the foot, we go into a cafo, and the ankle foot orthosis when it comes above the knee and an H cafo. And for example, spider braces describes as TLS, O's theoretical lumber or those sacred orthosis. So, with that, that's the way we kind of like describe our orthotics. Right?

Steven Bruce

I just had a question from Nick, who's wondering whether the London orthotic consultancy also provides NHS services or is it purely private?

Sam Walmsley

So we have the odd NHS patient who seek us out often, it's because their local service can't provide what they want, or there's been a problem and to replicate that problem. Maybe the referrers can find a route CS, but we don't take a routine referral from the NHS? We're purely private clinic.

Steven Bruce

Right? Okay. Right. So I interrupted your flow there, what do we got next has another another complicated algorithm here as well?

Sam Walmsley

Yeah. So again, importantly, one of the ways in which we manufacture the orthosis is by taking a plaster cast. So a plaster cast has to be set at a very specific angle, if we're going to get these things, right, because the range of movement that we set the ankle at will determine how well the patient can move within the orthotic. So I've just seen a patient this morning, and I've taken a cast of him a plaster cast of him, and I set his ankle at minus 15 degrees from neutral. So you know, 90 degrees would be about there. So I've dropped his foot down by minus 15 degrees. And this is this is going to get a little bit complicated. But the reason for that, if everyone's interested, is that the gastrocnemius muscle affects three joints, it affects the knee joint, the ankle joint and the subtalar joint. So if I set this and if I assess this child, as is pointed out in this algorithm, and you can only achieve minus 15 degrees with his knee extended and his Rif are held in neutral subtalar, joint neutral, I, if I'm expecting him to walk standing up with his knee extended, I have to set the ankle at that angle, he then can also achieve a terminal swing to be able to swing through terminal swing, and get potentially get heel strike as well. Because if I was to set him at 90 degrees, it will tighten the gastrocnemius, which means you'll have less range of movement at the knee. So it was getting a little bit technical. But then again, what I wanted to demonstrate with that slide was that actually, there's an algorithm for how we cast and how we prescribe these orthotics. It's very late is very well set out and and evidence.

Steven Bruce

Yeah. Um, somebody asked what the difference is between your orthotics and NHS orthotics are they producing as good quality as yours or my own experience of normal, if I can call them normal normal foot orthotics is the NHS ones tend to be clunky and not particularly sophisticated?

Sam Walmsley

Well, I don't want to, I don't want to, you know, be rude about anyone in from in my profession. I think that, you know, the orthotic profession in general, suffers from managers giving us a lack of time to deliver what we need to do. So for example, I will bring it up in the clinic, the assessment I did, someone took me two hours, I walked them over a gait lab, which is a piece of equipment, a 2d video to get lab is a relatively simple piece of equipment. So some forceplates in the floor. And I'll show you some videos later to explain this. But the force that the patient exerts on the floor has an equal and opposite force that then is emitted on my screen and matched up with the video. So I know where that force is relative to the ankle, knee and hip. And then I can just then I can prescribe my thoughts effectively or fine tuning. So first, first thing if you haven't got that, that's that's very, it's like, you know, a midwife that's assessing without ultrasound, for example, or accessing a fracture with an X ray, you got it, you've got to have these bits of kit in your clinic if you're going to do things properly. But also it took me two hours, you know, when I was working NHS, you have 20 minutes for the same type of patient and you have to cast in that time as well takes me half an hour's cost to do it properly. So there just isn't really the time, a lot of time. And one of the other issues is that the way that the orthotic industry itself is constructed is that a lot of manufacturing is done in hubs. And that's to create efficiencies. So, you know, a manufacturer might be in Sheffield, and the new office might be in Brighton. And then so the communication between the artist and the technician is via scribbles on a bit of paper or maybe an email. And that's how you that's how you get something completely bespoke made for a very challenging presentation. And then you got 20 minutes to fit the other end. Whereas you know, here we have two hours to assess it a gait lab I take upstairs to my technicians in the workshop and say, Oh, this is a tricky one. Let me see it. costing stage, let me see it a rectification stage, let me see it in my, to my stage, as I have so much input, that that feedback between the technician and the orthotist is essential. I couldn't do it without that. So there's a big difference between what the NHS can supply because of the limitations set point, but also the structure. It's, you know, not and I have to say not all NHS units are designed that way, there are some situations where the manufacturing is in house, and that works a lot better, I think. But, you know, a lot of a lot of the situations that often find themselves in are are, you know, pretty poor for them to be able to deliver a really good orthotic. Yeah.

Steven Bruce

You talked earlier on as though the ankle. plantar flexion, dorsiflexion was the primary elements of the orthotics. There must be other elements that you you incorporate into them?

Sam Walmsley

Yeah, of course. So you know, we're looking at the sagittal plane at that point, you know, what, what, what are we concerned about, in terms of how we align your thoughts, sadly, it sometimes, you know, generally an orthotic should be set up in neutral. You know, there are some exceptions to that. But when when we

look at the coronal planes, so this, this patient had, you know, huge valgus collapse of the foot and ankle, almost, which with approaching mid foot. And so what I'm looking to do is try and create a very neutral calcaneus relative to the calf, so that when they stand, the waistline is going through that area so that they're not rotating and collapsing through the middle for that. And then there's the other sort of slightly sort of more artistic things that we get into where we're trying to scoop and support areas of the foot to take pressure off bones, like the navicular, or base or fifth. So where we are considering some of those elements all the time, and orthotics almost should be set up like that. The ankle angle is very important, because it's also slightly counterintuitive. And this is one, this is a very important point. And this is this is really lost, perhaps in orthotics and for many years have lost in orthotics. And I thought it was always set up not at 90 degrees. And that's because the evidence was that we in normal gait, we stood in mid stance when you're when you're going through right in the middle of your stance phase. So your standing leg is on the floor, and the other swinging leg is got foot in the knee, the side of the standing leg, it was thought that that leg was at 90 that the shank was perpendicular to the ground at 90 degrees. However, that was wrong. Actually, the shank is always inclined slightly so and how we then set up the whole HFO in terms of the ankle angle and the shank to vertical angle has been completely sort of reimagined. It's happened a while ago, but it's really only taught starting to take, take hold. And again, this is all work done by Elena and her group and banger and some other people around the world. But it's the person I know best to really re educate our profession. And you know, orthopaedic surgeons who were asking for the 90 degrees, both in terms of the shank angle, and also the ankle angle. They've got a couple of slides on that later, actually. But yeah, it's a very important point and perhaps one of the ones that you always like to hammer home when you're doing these presentations because sure is dammit if you get make a nice pair of earphones with wedges on people ask you why those wedges on the ears they're not wedges that the ankle angle and the shank vertical angle. let's describe them in that those terms. And then and then you can perhaps move the debate on a little bit.

Steven Bruce

There's a lot of evidence, I believe that the proprioceptive feedback from orthotics in a non cerebral palsy patient is has quite an effect. Is that same with cerebral palsy patients.

Sam Walmsley

And yes, I mean, I did. I did. I've done quite a lot with proprioception prep set of insoles that were quite remarkable in terms of how they changed body posture with very small little wedges on under the first met head and some some really interesting stuff that I used to do when I first started here. It i think is a different element is a different type of purpose session, what we're looking for is getting stability through the foot and ankle so that someone with a movement disorder feels stable. You know, if you're, if you're walking on a foot that is wobbling around underneath you, how can you then control your knee and your hip effectively? So we're looking to really stabilise around the foot and ankle with the orthotics and that, in that sense, helps with the proprioception there were some things called delphos. And there are some things with Atlas which has something called a neurological footplate that was reported to help with perception and read and be tone reducing. I think what they're actually doing is they're pushing in on all the soft bits of the foot and making sure that when a child moves, they feel super stable. So then that has a tone reducing element to it. So it's quite an interesting side of what we do. But it is it's, it's something that we're, we're

perhaps aware of, we don't necessarily go out there to improve that. But it happens naturally, if you make good and wealthy enough.

Steven Bruce

We've got quite a few more questions coming next come back in again, because you're using terminology, which is not common with us. When you say the shank, do you mean the angle of the tibia or the tibia?

Sam Walmsley

Yeah, sorry, again, I should perhaps explain it better with a slide later. But the shank is the lower leg sanghas, lower legs, the shank to vertical means you take a vertical line to the ground. And where is that shank line sitting on it? Is it is it not? Is it zero? So that would be Yeah, that shank is perpendicular ground as well. Or we always set them between 10 to 12 degrees 10 to 15 degrees of CP. But normally, if I measured a normal population of gait patterns, then that shank would be with intense 12 degrees to the vertical line.

Steven Bruce

Okay, I'm going to offend some of my audience and be accused of sexism here. But I think this question is coming from one of my female viewers, says another leopard print orthotics behind you more expensive than the other ones?

Sam Walmsley

Absolutely.

Steven Bruce

But what is the purpose of that is just to make them more attractive.

Sam Walmsley

I mean, we're treating children aren't we and and children want to feel that there's got to be an element of fun to these things. I mean, orthotics. Yeah, they're not, they're not something you want your child to wear, they're not something that you want to wear yourself. It's an unfortunate consequence of having a condition. We're trying to try to make them a bit more fun, a bit more engaging for the child. And it's a it's one of the things that the child always likes doing picking the colour with a splint and going through it with their parents to decide which one they want. And there's always an interesting battle between the parents who want to maybe have something a bit more subdued to the school, and the child who wants the multicoloured rainbow ones. So it's it but but yeah, it's to generally add a bit of fun to it. And I think and that's, that's available across all it's not just a private practice thing that that's that's NHS providers as well. And

Steven Bruce

I'm guessing that last one is a carbon fibre orthotic are all of yours carbon fibre?

Sam Walmsley

No, no, not at all. We we provide comm fibre, a lot more more vital population. So you know, and especially for for some of the more stroke patients Ms. And they are you know, they're lighter, they're stronger, we can apply joints to them to make them more dynamic. And, but they also are a lot more expensive. So you know, to do it for a child. And we do occasionally get asked for when parents or there's a situation where money is not as such a problem. And we do occasionally get asked to do it, that you know the issues with carbon fibre or it's less easy to adjust with with the plastic fence, we can adjust them. And if I make the best fittings, parasites in the world, we will have to adjust them because the child is going to grow. So when you make something at carbon fibre, you have to be careful to think about where that child might grow and how you're going to then facilitate that within a splint to make it last as long as possible. Because you know, if you spend 3000 pounds on a pair of efos, you want them to last a year at least. So even you know even in for a child. So these things can get very expensive when you get into the carbon fibre types. Somebody actually knows how long it takes to get used to wearing these things, particularly if you've got one of your hip knee ankle officers. And that's it's a good question. If they are well fitting and they are designed correctly, then you should be comfortable straightaway. You know, again, I we we always offer a service that allows patient to come back because I can't ever guarantee that what we make is going to be successful. First go, it's so patients can come back and see us free of charge and get things sorted and fixed. as as as many times as they want to. Because you know being comfortable in a splint that you've got to wear all day every day is essential. You can't. But if there are other elements that question really in terms of like, you know, if you're teaching your child how to walk, and how quickly does a child get used to it? Well, actually, sometimes you're you're going through developing them their motor skills and their motor patterns. There's some videos later that I can explain that with. And so actually, there's an element of getting used to in terms of beginnings walk properly as well. You know,

Steven Bruce

I don't know, I don't know how many of your videos we're going to get to one you got a quarter of an hour left and I've still got loads of questions to ask you so we might be booking you for a phase two in a little while. Somebody asked about whether these orthotics are also useful in cases of muscular dystrophy and in particular Whoever asked the question has a patient who's got orthotics, but they're not always comfortable?

Sam Walmsley

Yeah, I mean, muscular dystrophy has a long history of using orthotics. And it's it's very important to stabilise and control those presentations. So yes, I would say that, you know, you know, a lot, a lot of the time, it's orthotics, we're confronted with these problems, orthotics don't work, I don't believe in orthotics. There's another one we get, which is really odd one, but or, you know, I've tried them and they don't work? Well, you know, it's like getting into a car that's broken down and single cause didn't work. I mean, you know, that, if you use orthotics, if they're designed properly, and they're designed correctly, you talk to the patients you get what their goals are, you manufacture them in a way which achieves those, then they should be comfortable. It's hard, I'm not saying it's easy, and we get problems as and, and as like anyone else. But you have to then be able to deal with the problems. So I'd urge I'd urge him to go back to the patient and seek out some some help. Yeah.

Steven Bruce

Stuart has asked what happens to ankle ligaments whilst in the cast and I'm assuming means the orthotic.

Sam Walmsley

Yeah, so the cast is on for, you know, three minutes, so we take the protect cast take off is purely taking them out. So, you know, ankle ligaments are, you know, they're stable, they're held in a good functional position, don't forget that what we're trying to control is dysfunction. So if a, if there is spasticity, specifically in the calf muscle, it can sometimes pull the foot into a pronated position, because the foot, the body weight is going forward no matter what. And so if you've got a calf that stops your ankle from coming from, you know, plantar flex to 19 into dorsiflexion, then and it's stopping, it's a minus five degrees, you're going to get movement forward somewhere. Now that might be by externally rotating your leg, it might be by completely collapsing your mid foot, you know, taking your mid foot here, and totally and utterly broaching it. And I've seen patients who do that, you know, and so, you know, in that, so we're trying to control dysfunction and trying to stabilise so ankle ligaments should be held in a good position. And and in, you know, long term goals for our politics are to protect bones, joints, ligaments, tendons, muscles, you know, in to prevent surgery.

Steven Bruce

And Nick has also asked whether you have views on off the shelf shop bought orthotics, and I'm not sure are people prone to buying off the shelf orthotics to deal with cerebral palsy,

Sam Walmsley

there are a few Yeah, I don't think there's so sort of off the shelf that you can't go onto Amazon and buy them so readily. But you can get off the shelf orthotics that are provided via you know, your orthotists, so they can prescribe something that's out of the catalogue. You know, there are going to be some rare cases where that they're appropriate, I would say, we don't deal with them, we find that, you know, if you're trying to control, you know, often 100% of something, you need something that you can fine tune, and you've got little things that you're going to want to control to 100%. If an orthotic is out by 5% over a year, that could mean your patient deteriorates. And so you've got to really try and hold it as best as you can. You know, so we tend to focus in on and that's our, our whole business really dealing with more complicated bespoke orthotics.

Steven Bruce

Okay, we've got to move along. Because we're getting the hang of time, you've got loads to show us. What was this particular image all about here as so?

Sam Walmsley

Yeah, so I just wanted to establish you know, what that by an artist is trying to take a child into normal gait, I just wanted to show where the vectors are at temporal mid stance, going through the knee, which is the middle picture there. And on the left hand side of the screen, you've got terminal stance, which is the most

important part of the gait cycle really, for us. Often people think that, that that the heel strike is the most important thing and parents will be fixated on we need to get heel strike. You know what, why is the child heel, heel starting? It is important, we don't don't think everyone we are going to look for that at some point. But if you didn't get terminal start, so many wonderful things happen in terms of starts, you've got a stretch on the gastrocnemius stretch on the hamstrings, a stretch on the hip flexors, and they're all things if you don't stretch them, and they get contracted, especially in spastic diplegia that will take a child off their feet, you know, in their teenage years. So getting getting terminal stance in the gait pattern correct with the orthotics is you know, it's like the sweet spot. It's everything that we look for. And we've sort of almost been slightly programmed to get all the air we got it get all excited. But I also wanted to show that what happens when you know normal gait you you plantar flex the foot in a high heel, but we still put that vector in exactly the same place. So it doesn't matter. That what we do with the foot in normal situations and normal neurology, we still want to position shank slightly inclined and get and get those backs in the right position. And, and that's why when we're prescribing our orthotics and importantly, when we're what we call tuning or aligning our efos, and splints and orthotics, we're always looking to get to normal, we want to, why wouldn't you want it to want your child to walk normally, therefore, we know we're normal. So let's try and recreate that on our on our gait lab.

Steven Bruce

I'm struggling with this one, because clearly, you've got a vertical line on both of the centre parts of this image. But clearly, the angle of the shank of the tibia cannot be the same in both of those because the foot is plantar flexed in the lower case because of the shoes.

Sam Walmsley

But But if to the vertical, so that that isn't a vertical line that we've drawn on that is a force plate line. So that's the vector. So that's where that lady is putting her force to make sure that she's stable. And that and temporal mid stance, she wants that force to be going through her knee, and then through her hip, and then preferably through her shoulder. That's that's a height, you know what that means she's going to be really balanced and stable at that stage. So if so that shank will be at the same angle the front of the tibia, if we make the front of that tibia on both to the vertical line, the shank vertical line, it would be the same angle, the foot is plantar flexed, yes. But that's not the foot that we're really interested in there, the foot can be plantar flexed, we will still get the same angle of the shank and the and the same vector.

Steven Bruce

Okay. I think we should also look at one of your videos now don't wait.

Sam Walmsley

Yeah, so this is so what I'm gonna do is I'm going to share my screen now. So this little girl is, is that playing? Okay? Yes, that's fine. Yeah, so this is a little girl with spastic diplegia. And so what we're looking at when she's walking is what's happening, specifically in this video in her sagittal plane. And we're looking at what's happening at the foot and ankle, so she's striking the floor with the forefoot, we're looking at where the vectors are. So they see the vector on that left leg is way in front of the knee. So that means there is now

what we call a hyperextension moment happening at the knee, either that knee is being pushed back. So that's incorrect. Also, the heel is coming off the floor too early. And as she rises through, you see the vector is now she's managing to get the vector into the correct position here, she's sort of doing it. But at the expense of her mid foot, if we looked at the coronal plane of her mid foot would be completely collapsed because she's got stiff calf. So and then as she stepped through importantly, with this little girl, she's actually got quite a tight hamstring. So as she steps through the, the hamstring on the tight leg spoils the ham, the gate on the good leg. So actually starts with the right leg, her left knee. So let me show you this, she swings through here, you will see the knee suddenly starts to collapse on the left leg. So that vector should now be in front of the knee still here, and that red line, and it's now behind the knee. So now this leg is wanting to flex which means the cord is too active here this and so we're we would want to resolve that with it with our orthotics. And if I just run it through, we see on the right leg, which is actually a more effective side, it's actually a little bit better. So it's I just thought it was interesting to show you how these patterns of movement can be quite difficult to interpret with with children. And understanding that will then lead us to onto the prescription for try and resolve escape pattern.

Steven Bruce

How much of hamstring shortening is functional and how much neurological

Sam Walmsley

I would say the majority of it is a neurological inflammation of the spasticity. But then what happens is because of the specificity and because of a gait pattern, which means that she's flexing a kneel, and she's not getting the correct knee extension through her gait pattern consistently, then it becomes a shortening. So, so one of the the next slide, I think on the presentation is shows the range of movement assessment that we would go through

Steven Bruce

right again, this will be quite complicated and hard to make out on a small screen but it is on the handout.

Sam Walmsley

There we go. Yeah, so so so I just wanted to show with this the the detail that we go into in terms of range of movement we look at we look at areas and then we sort of highlight areas which have problems and that will lead us to conclusions about what how we're going to build our orthotics, but also you know what, what outcomes do we want to achieve this child specifically for her we wanted to increase the length of her calf muscles so minus four degrees and minus eight degrees on her right are we need to employ Through that over a period of time, and that would be a really powerful measure for that patient. Because if we can take a child and, and move them in a orthopedically in a positive direction, that means every step that they're taking is doing some good, which is a really, I think, a powerful outcome measure. For our robotics, you know, sometimes orthotics are measured in you know, get up and go. So they measure people across a 10 metre walkway, see how fast they are? That's all very well. But actually, if you say, I'll review in three months and see if your calf length is better, we know that you've We've been walking better for that, that whole three months.

Steven Bruce

Presumably, you go back to that diagram we saw earlier on and the main outcome has got to be the quality of life. Yeah. your calf length is how well they can perform the normal daily functions.

Sam Walmsley

Yeah, absolutely. It has to be so yeah, if we, if we've improved their calf length and they can't walk around the classroom, then then that's a problem. But it all has to feed in and work together. You're exactly right. Yeah.

Steven Bruce

This is we could probably ask this at the end, but we really are running out of time. Becky is asked whether you have any patients with EDS where orthotics can help Ehlers danlos

Sam Walmsley

Yes, we do. really complicated group of patients. always a challenge to get something that fits really well. Always knock on effects from buying orthotics. If you if you really stabilise a joint, there's always a another joint that that could potentially become victim to a force that you just weren't considering. So, but and they require a lot of time, a lot of patience as a clinician, and but they can be they can really be helped. I mean, some of them are incredibly challenging when we're when we're looking at stabilising the Atlas with CTL. SOS, so yeah, very, very difficult patient groups, and we do have them here.

Steven Bruce

Okay, come up with ctls ohms.

Sam Walmsley

So, essentially a headcollar that comes right up and then comes right down onto the pelvis. Right. Yeah. to stabilise the whole spine and the head in the neck. Yeah. Okay, so another, another lecture.

Steven Bruce

Is this the same young lady here that you were with in the previous video?

Sam Walmsley

Yeah, so this was just the orthotics that she walked in on. And so, you know, part of the thing that we were looking at is she'd be wearing headphones and a range of movements poor. So you know, can we improve this range of movement over time. So, in this set of earphones, in this diversify in this video, if I show you this. So she's got earphones on, she's been prescribed them without really footwear. And you can see that as she steps through, you see this trade this swing right leg, put pulls that left leg and that vector is still behind the knee. So that's, that's the pair of earphones she's been prescribed. She's wearing them all the time, but they're not working. And they're not working because someone hasn't stabilised the forefoot correctly to really push the knee back. So if I quickly run on a prescript prescription where we go, we go. And we look at

the difference with the orthotics that we've prescribed. So as she steps through now onto this left leg, that green vector on the on the green and the red, just mean, left and right doesn't mean good and bad. But that victory now is touching the front of the knee as you swing through, and so we're getting knee. And importantly, at this point, just here, we've got hip extension, and knee extension. So we're stretching out that hamstring, gastric knee, Miss every step. And you can see the difference with her step on the original vertex where she's still got knee flexion. So they're quite subtle differences sometimes. But importantly, they make a difference to the patients, you know, outcome.

Steven Bruce

And I've I put up the next slide here, but so what specifically did that young girl find that was better what improved in her life as a result?

Sam Walmsley

I mean, I think the main thing that children will say when you put a good pair of orthotics that have been tuned or aligned properly is that they feel more stable. So they're able to stand in a more stable position without hopping around sometimes and moving around because they just haven't got balance, when often it's as simple as putting a wedge with my Mike Flanagan's, always covered with with wedges. No, that's a big one, but we've got wedges everywhere to fill in the void underneath the heel. So and as we do that, and I mean I've had a child walk into my clinic room with a pair of earphones that I prescribed and they just weren't getting on right and a three millimetre wedge underneath and the The Hill sorts out all of their kinematics, their balance, and they walk out happy. So it can be a very subtle adjustment to get the balance and stability.

Steven Bruce

So we've got two minutes left, and I don't like to run over it unconscious that many of the audience will have patients coming up very short. Yeah, I think perhaps one of the things that will be useful for us to look at is how we would spot in a patient that they've not been given proper orthotics. And I wonder whether you could help us out with that one.

Sam Walmsley

So I mean, typically, we're looking at the alignment. So you can pick up an AFM put on the patient's leg. First of all, is it fitting? Well, is it all the contours nice, are the biomechanical control points? Strong. So you know, a leg should fit nicely and snugly into something. And this, this point here should be really well controlled? And if you get all that, if that if that looks good, are they aligned correctly? Have they got a wedge? Or have they got a footwear prescription that came with it just the patient say, Oh, yeah, they told me to wear these shoes with this wedges, that's that's a good sign as well. So but if it's if it's going wrong, I mean, this is what we're what we're concerned about when we're prescribing. if something isn't right, and it's going wrong, then we start to see these types of things happening this, this on your slide, there is something called patellar, outer. So on the on the right, I've sort of, you know, crudely drawn on the kneecap where it perhaps should be. And what's actually happening here is because this child is walking around in crouch gait permanently, and so their knees are bending that vector line off the force plate is behind n equals encourage

gait. The the quad is working so hard, it's pulling on the patella, and that patellar tendon is stretched. And so that that kneecap actually starts to move up. Now, that's a problem both in terms of you know, the efficiency of that muscle, but also pain. And one of the biggest indicators of quality of life is pain. And if a child and often I think I'm right in saying this, but you know, quality life in, in a disabled child or the normal population, it's pretty much the same, until you add pain and bump, quality life drops right up off the chart. So we have to avoid pain and that that child is in pain with any there are 13 years old and is classically something that happens in adolescence. So they've walked around with a problem for, you know, 10 years, and now that they've got knee pain that needs to be addressed by a very aggressive orthotic to really help and stabilise them. So we would make this that patient something like this very stable prescription, big front shell maximising lever arms up here, maximising lever arms on the, on the forefoot as well, and and to deal with that issue. But you can see what what I wanted to demonstrate with that slide was, you know, the, the implications on the on the body of getting biomechanics wrong over a long period of time.

Steven Bruce

Okay, last very quick question. I only I hope it's a quick question, Mark is gonna take us back to that video of the young girl with her correct orthotics. And as pointed out that she was using a stick to stabilise herself in the in the good orthotics.

Sam Walmsley

Yeah, so we have to make adjustments sometimes if we want to, often when you that, that was sort of the initial fittings of what we're doing is we're saying we've got to have your walking properly, we need you to be perhaps a little bit more confident and stable. And when you apply a new prescription, it sometimes takes the children a little bit of time to get used to them. So we might use a walking aid to allow them to do that initially. But what's important is that we we hopefully move past that at some point and so they can put down a walking aid, but also that they we get the biomechanics, right.

Steven Bruce

Okay, that's brilliant. Thank you. So I'm sorry, I didn't have time to go through all of the material you've sent over for the presentation. On the handouts obviously, we have the details of the London orthotic consultancy, easy enough to get in touch with you or with your fellow experts there if anyone has questions about this.

Sam Walmsley

Yeah, there's we've got clinics around the country now we just opened up Manchester and but if you if you own the head office in Kingston, then we can set something up for you to get to have a chat with one of the orthotists we've got nine orthotists and with varying different degrees of specialism, you know, orthotics are are complicated, they are difficult, they can help a lot of patients. So if you've got something I wonder if that would help it, you know, chat to one of the artists, I'm sure you're very approachable, nice people, and we'd love to have a good conversation with a like minded clinician.

Steven Bruce

Sure. And it occurred to me earlier on is our orthotics a standard prescription for all cerebral palsy patients. Would we be strictly

Sam Walmsley

right? Sorry. Yeah, yeah, it's a pretty much and understood that the CP population will at some point, you know, have some kind of authority. And yeah, so that's it. That debate is largely been One Yes.

Steven Bruce

Brilliant. So I'm thank you so much for your time. And I'm again, I'm sorry, you had to cut it short, but I'm sure we've all learned a lot from that about what we should expect from the orthotics and obviously, who to refer to if we think that things might not be going according to plan.

Sam Walmsley

Yeah, great. It's been a pleasure. Thank you very much.

Steven Bruce

Our pleasure. Thank you.