

Hip and Knee Cases - Ref 139JS

with Joyti Saksena

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TRANSCRIPT

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Steven Bruce

I'm joined today by Joyti Saksena, who is a very experienced consultant orthoped down in London, working out of the Royal Free. It's his second appearance on the show. Last time we talked about patella problems. Today we're going to look more at his main specialty, knee and hip and he's got a number of cases which are a little bit, as he described them, off the beaten track for us. Joyti, great to have you with us again, thank you for joining us for a second time.

Joyti Saksena

Thank you very much for having me, Steve, and thank you to all your audience out there.

Steven Bruce

What I didn't say is that you're also the chairman of the North London Orthopedic Clinics, aren't you, which is an organization designed to take the load off the NHS waiting lists. That must be keeping you busy at the moment.

Joyti Saksena

Yes, I think even in the private sector, actually, what's happened is they've actually really curtailed down a lot of the waiting list-type work. I think the main reason as we were discussing earlier is that in this current lockdown, in the first lockdown, all specialties, including trauma through, everything, was just shut down and there was a lot of capacity in terms of bodies, people available, in the second or lockdown 3.0 as they're calling it, actually, orthopedics, ENT, maxillofacial are all these services are still running to a capacity. So, the number of bodies aren't being freed up and therefore, what they've done is by reducing the private sector amount of work, they've allowed to free up consultant time and nursing time to be able to then support the NHS. So actually, the workload, although it is down, it's just forever building.

Steven Bruce

But you, of course, at the moment, are not working terribly hard, I gather?

Joyti Saksena

No, unfortunately I am self-isolating at home. My wife, she's an anesthetist, she did some ITU shifts last week and unfortunately came down tested positive for COVID last week. So, although I'm negative, I'm having to self-isolate for the next 10 days and even help out with the homeschooling. So that's been another challenge.

Steven Bruce

Shall we move on to your hip and knee cases?

Joyti Saksena

Okay. So, these are four cases that I'm going to going to give, essentially, and I'll try and stop after each case. And it's really the discussion, I really put these cases up for discussion, just to hopefully stimulate some questions and then I'm happy to talk through. So, I'll start first of all, this first case is a 32-year-old female. She's a marketing executive, so predominantly a deskbound role, but she was out skiing a couple of years ago when people could ski and sustained an injury to her knee. Slight twist, bit of a bruise on the inside. She was able to carry on, but then soon enough, had to stop. And then these are when she came back to UK, she was able to weight bear, not in too much discomfort. Yeah, so these are the plain x-rays at the time. And arguably, there's not too much one can see at that stage, with the sort of eye of faith on the lateral view, there is some sort of bony changes on the medial femoral condyle, but the real kind of thing is that, after managing for 6-12 months, she just really wasn't getting better. And then she came into clinic and we did these MRI scans for her, which effectively show kind of a large medial osteochondral defect on the weightbearing portion of the medial femoral condyle. At this time, what I would say is that the options at this stage really are essentially, she's 32, she's got quite a significant defect there, she is symptomatic, it's affecting her everyday activities, she's not really able to do much in the way of sports. And then in terms of what is the decision making, once you've managed to through, rehab, physio, osteopathy, tried to strengthen the muscles, trying to offload that side. We even considered an offloading knee brace, which helped but she found it a little bit cumbersome. So, then she got onto the stage where, what are the surgical options and at this stage, it is quite difficult. She's got a full thickness defect. So just doing some kind of cartilage, microfracture or cartilage transplantation, is not really going to help because the bone underneath it, the bone supporting that cartilage, is just not good quality. And likewise, she's not really in that age group where one could consider any sort of replacement options, obviously, you're not going to go down the route of total knee replacement or even a partial replacement. But sometimes you can get these metallic kinds of focal replacements that people are doing and with a reasonable success, but at the end of the day, that is still a metallic implant, you can only progress from there to some sort of replacement or partial replacement. So, we were trying to look at ways of what can we do from a biological perspective. And so, in terms of the options we have, it was either putting some sort of plug of bone in there using allograft. But again, the issues are with disease transmission and rejection and that sort of thing. So, then we used a technique called an OATS procedure, an osteochondral procedure to effectively take a plug of bone. So, these are the findings at arthroscopy, again, not obviously, sort of significantly wrong, but you see this kind of discoloration in the cartilage. And when you probe that area, it just pushes right in. Okay, so what we're seeing here is the medial femoral condyle, I've obviously marked it in purple, the extent of the defect, but that is a really full thickness defect, that cartilage is very poor and the bone underneath it is very poor. So, we then elect to take that core out, effectively with an apple corer. Yeah, so this is taking out a core of bone and cartilage, you can see the thickness of the cartilage, a couple of mils, and around eight, nine millimeters of bone, from an area of the knee. So, we actually take it from the sort of lateral aspect of that medial femoral condyle, so right on the edge of the non-weight bearing area, and we then create an apple core to the area that's damaged, and essentially put that back into the area, just like a jigsaw puzzle, you got a spare piece of jigsaw, and you're cutting out a piece exactly like that, and putting it into that area,

Steven Bruce

Where's the replacement piece coming from?

Joyti Saskena

This is coming from effectively an area of non-weight bearing bone. So, on that picture, it's in the sort of top right-hand corner. I don't have a slide of that but it's essentially just literally on the edge of that medial femoral condyle. So, where the patella glides, we're not taking it from the trochlear part, we're just sort of more medial to that trochlea. And we backfill that defect with some bone graft. In fact, that bone that we've taken out of this area, we sort of crunch it up, we put some platelet rich plasma, that's taken from the patient's own blood, we mix that as a kind of a scaffold, and we put that back into the defect. So that fills up that secondary defect, but that cartilage in the weight bearing area, we can take good cartridge and good bone and effectively put it as a graft. So that is kind of effectively, you're plugging a defect with a biological graft, as opposed to using any kind of metal or anything like that. And as I say, ideally, we would want to just do a microfracture procedure where we drill bone, stimulate bone, put some cartilage cells in there or a scaffold, but because the underlying bone is so kind of soft and it's just not going to hold, it's going to fail. So, we need to structural allograft. And obviously there's no better graft to take them from the patient's own supply.

Steven Bruce

Can I ask, Joyti, were you the first point of contact for this lady when she came in?

Joyti Saskena

No, so like a lot of these people, they do go around the houses a little bit so you can see what those, she was seen in casualty, plain x rays done, and in hindsight, there are some changes on those x rays. But she then went from casualty back to GP, saw her GP for a good few months went into, did in fact some private physiotherapy, the physiotherapist then actually picked up, look, she's just not progressing here. I think at the very least she needs a scan. Then she gets referred in, I saw her at Royal Free so through the NHS, that process, as you can imagine, takes a fair bit of time. And then eventually, sees one of the team, gets a scan, and then it's discussed with me. And at that stage, she was actually seen by another consultant and put on a list for an arthroscopy, just to have a kind of a look and see, but it was very clear from the MRI and the arthroscopy findings that this was not going to settle down by itself and it was really hampering her lifestyle.

Steven Bruce

The point of my question, of course, is that we could find ourselves, osteopaths, chiropractors, in that position of being nearly the first point of contact, is there anything in the way she presented that you think should have alerted us earlier on to the fact that there was an underlying problem? Or is it inevitable that we would go through a couple of months of trying to get her better before we thought, no?

Joyti Saskena

To be fair, I think the mechanism injuries is probably key, the fact that she did have difficulty weight bearing, difficulty for quite a few weeks, it wasn't just sort of a few days and things settled down. I don't think it's unreasonable to try even 1 or 2 months of rehab, 4 or 6 sessions, because you guys will see patients, patients that they're either making progress, in which case, you continue with that rehab pathway,

or they drop down or plateau. And at that stage, I think it's worth referring, or not even referring I think, for me it's getting the diagnosis. If people aren't getting better, you need some kind of diagnosis and generally, that's going to be an MRI scan, to find out what's going on. If the MRI comes back, and it's not showing too much of the way of concern, then you continue down your rehab route. And at least you know that you're not doing more, by delaying it you're not doing more harm as it were. I think that's where the discussion is so important. And I always tell the people that I work with in the rehabilitation sectors that, give me a phone call, send me an email, just ask me a question. By and large, it's going to be, well, if we're not progressing, let's get a scan and let's move them on to that to the next stage, let's get that diagnosis.

Steven Bruce

I have to say, it's a difficult position, which I think we find ourselves in a lot in our form of private practice, because, on the one hand, a patient won't thank us if we send them off for an expensive MRI that shows us nothing and they carry on with normal rehab. But on the other if we charge them for two months' worth of our rehab sessions, and then say, well, we better find out what's going on now. They'll ask us why we didn't do that in the first place.

Joyti Saskena

Yeah, I think you're right, you're damned if you do and you're damned if you don't. I think, I would again, it's been clear with the patient that look, these are the, when you see them, I'm sure osteopaths as well as physios as well as orthopedic surgeons, you're going to go through your history, your examination, and what is your differential diagnosis? And what things are we going to be treating here, what things are we going to work on. And by and large, you say to that patient, well look, we'll give this a few weeks, if they're not getting better than I think we need to do an intervention or get some further imaging, confirm the diagnosis. And then it may still be more rehab or it may change tack from there.

Steven Bruce

What was the underlying cause of that injury?

Joyti Saskena

So, this is effectively like an osteonecrosis. And I'll come to a little bit about that when we've got a case in the hip. But effectively, the bone dies, it's taken such an impact and the blood supply, the underlying blood supply to that bone has effectively died, that bone then starts to degenerate, the cartilage then which is supported by that bone then dies, but it's a slow process, and there'll be some creeping substitution, some bone healing, bone dying, bone healing, but over the course of time, it just doesn't survive. So, it's one of those cases where you can't just try and, often our first port of call is trying to stimulate bone. So that's why we do the techniques of drilling into the bone or some kind of cartilage grafting some kind of biological stimulation, but she'd just gone beyond that. Clearly, at that young age, we didn't want to go down that route, if that was a 45-year-old I'd probably go down the route of more looking at partial replacements and things like that.

Steven Bruce

Caroline has asked how the boundary of your apple core part heals in the new position. Is it completely smooth? Is it just natural bone healing?

Joyti Saskena

Yeah, so essentially, it's a difficult one because we're dealing with a convex bone and when we take the graft is often in a flatter area. So, we generally try and leave that plug ever so slightly proud, because we know that there's a little bit of impact as they weight bear that'll push it down. And generally, we know the knee is good at sort of smoothing things off. But yeah, you're trying to get bone to bone and cartilage to cartilage. And effectively using the host bone and the inflammatory mediators, cytokines, growth factors, to then through the process of creeping substitution fill in that bone, so remodel that bone. The cartilage itself, it's difficult to know, some of it will heal because if you get blood supply back to that bone, that cartilage will stay alive, some of it does die, but the cartilage around the periphery kind of starts to invade into that sort of space and fill it in. I guess the true test is going back into that knee at maybe six months, probably a year to see, because sometimes even a repeat MRI scan, it can be quite disappointing, you can still see very clear edges but clinically, that patient is usually improving. She certainly noticed a quite a significant improvement to where she was clinically within the first few weeks, once the initial pain and swelling went down, she could see that there was a difference. But we will follow her up to at least a year, 18 months to make sure she's healed.

Steven Bruce

You're confident she'll get back to skiing eventually?

Joyti Saskena

Am I confident? I mean, I don't know if skiing was her thing. It was her first time and probably she's been put off for life anyway. But yeah, I don't see any reason. If you think about even a fracture where once they heal, you're happy for them to go back. This is kind of like a fracture, but a very contained fracture. So, I'm confident that that just won't fall out as long as it osseointegrates. And we're generally guided by the patient's symptoms, as long as she's improving, then we'll continue. If there's any concern, yes, we would get a repeat MRI scan. But as I say, that doesn't always give us the answer and sometimes you don't have to go in for a second look and actually probe the area to see whether you do get sort of bleeding into that area or whether it's firm, as opposed to soft and mushy, then you know it hasn't taken, but because it's autograft it's a really good chance of healing.

Steven Bruce

Can I ask what you'd expect the long-term outcomes to be, do you have data on this particular procedure and whether she's likely to get earlier osteoarthritis?

Joyti Saskena

Yeah, so the outcome for defects less than 10 millimeters are pretty good. So around 80-90% have no or minimal osteoarthritis at five years. Where you get slightly larger defects and where you're having to put multiple plugs, so sometimes we do something called a mosaicplasty, which is where, effectively if you

imagine that defect was nice and circular one core filled up, but if you've got more of that sort of oval shape, you're having to put two cores on top of each other, almost like a sort of figure of eight type pattern, and that's where the supporting bone is less good. So, defects we know above 10 millimeters at five years have a 50% chance of healing and that goes up sort of statistically as the size of your defect goes up.

Steven Bruce

Well, let's hope for the best for this lady, whether or not she goes skiing again.

Joyti Saskena

This is a 43-year-old gentleman, he works in the city, he's a banker. He's a very keen runner, he's been running pretty much all his life from his teens. And has recently been training up to do marathons, this is now probably 18 months ago. And he presents really with bilateral anterior knee pain after a number of significant runs that he's done. These are the MRI scans at that time. And you can see really both knees are fairly symmetrical, slightly tilted patella, slightly longer lateral facets but significant edema, sort of bone edema within the patella. So, we know that those patellas are being overloaded. He's got cystic changes on that right side. And also, the cartilage affecting it has, all the cartilage underneath has significantly worn out. Yeah, so for him, again 43, one could argue well, look what are the replacement options? Replacement options would be effectively a patellofemoral replacement. Again, replacing with metal. The rest of his knee was pretty good, his tibiofemoral joint was pretty good. So again, in this particular situation, we need to address both the articular cartilage and the bone. But as opposed to the first case, the bone isn't too bad, it just needs some kind of stabilization. In other words, trying to increase the pressure in that area just to stop that bone from collapsing, it's not quite got to the stage where it's collapsed. But also, we need to do something to the cartilage. So, in this particular case, what we did we used a shaver and we took articular cartilage, again, from a non-weight bearing portion of the knee, so we take it usually from the notch of the knee, we then put it through this process on the right side, which is effectively separating that cartilage from the fat and all the other things. And then we mix it with the patient's own platelets and thrombin and create a kind of paste of cartilage and we put that into that area of defect. And then on top of that, this is a technique called a subchondroplasty, where we're actually under X ray control and under that sort of vertical probe is the arthroscope, so we're looking at the knee, and we're using X ray control to inject calcium phosphate into the bone. So now we've then supported that bone and that deals with the sort of bony edema part of it. And the cartilage, we're using a cartilage graft in the form of a paste and their own cartilage to put into that defect. Again, these are biological options to try and stimulate new cartilage and stimulate new bone. But without going to the morbidity of taking a bone plug, which obviously does have a morbidity, because you're taking it from somewhere. And with the patella, because of the shape of it, it's very difficult to get a plug to fit into that area. So this is a sort of an alternative option, where you can stimulate the bone, in other words, use this calcium phosphate, which is just natural bone materials, inject it into that area to effectively make that bone a bit more strong, support it more, and then put the cartilage as a kind of a bit like when you're working when you're filling a hole in a wall with a bit of Polyfilla, we're putting that paste into it with the hope that the surrounding bone provides enough nutrients and blood supply to try and heal it.

Steven Bruce

You make orthopedic surgery sound very primitive and brutal.

Joyti Saskena

That wasn't my intention. There's a lot of finesse involved in it.

Steven Bruce

This chap you just described, he sounds like the sort of person who would come to an osteopath, chiropractor, physiotherapist, and would probably get quite lengthy treatment trying to sort out bilateral knee pain. We might well have gone through soft tissue treatment addressing things in the hip or the lower back or even orthotics for the feet before we thought saying, well, nothing's getting better now that send him off to you.

Joyti Saskena

Well, I don't actually disagree with any of that. I think, in fact, that is really the right approach to take. And again, I strongly believe non-surgical options are always the best options up to the point where they can't tolerate it, in other words, once the condition progresses, and that's where the relationship comes in, that's where getting the imaging, and then the discussion, because even with that discussion, it wasn't that he just opted for it. We had the discussion and then we said, look, you can try to rehab as much as you can. He got to a point but I guess the issue with him is that he wasn't prepared to simply just give up running, giving up, you know, he was a cyclist as well, he was a very keen sports person so he wasn't happy to just give those things up. So, it was like, well, what's the next step? What else is out there that we can do, but doesn't involve kind of replacement? He definitely knew he wasn't ready for that side of it. And I agree, he wasn't ready for that. And therefore, this was, for me, having had the discussion with him, we came to that conclusion.

Steven Bruce

The procedures you've described are available on the NHS?

Joyti Saskena

Yeah, I mean these things are available to an extent. Now what happens is that, sometimes you get these things under the radar, these procedures, certainly the two that I mentioned, are not that expensive, because you're using the patient's own bone. It's where you have to order bone or take allograft or that sort of thing, that's where it becomes really expensive. Because we're using all the patient's own material, it's actually just the cost of the disposables. So actually, a lot of these things come in under one or two thousand pounds just in terms of cost wise for the actual equipment. Some hospitals will, certainly at the Royal Free we've been able to do it, we do quite a lot of this work with a couple of my colleagues. Other trusts, you sometimes have to put in what they call exception type, the CCGs will question these things so you put in these kind of exception pro formas. So, they are available, but you sometimes have to push quite hard if it's not freely available.

Steven Bruce

So, does that mean that elsewhere in the country, the patient himself or probably the osteopath or chiropractor won't know which of these procedures is most appropriate? Are most orthopedic consultants, knee specialists, familiar with this and would they ask for it or they just accept the constraints that NHS applies?

Joyti Saskena

Yeah, it's a good question. I mean, I would like to say, yes, I would expect most knee specialists they would know about these things. Again, these are not things that have just come out. They've been around, they've just been with the companies that we work with they've modified it, they've made it much easier. For example, that last procedure, we've done it all through arthroscopy, as opposed to initially, you could do the same procedure, but it would be an open procedure. You'd have to shave bits of cartilage off, do it all open, flip the patella, and that has a morbidity as everyone can imagine. They've refined everything but in terms of do people do it, I think it's still considered even with insurance companies, you often can't get these through insurance companies, because they will say, well, the data is not there to support it. And in fact, some of the older data is actually not that great. It's just that now we've got newer procedures, newer techniques, we need to collect that data, we then need to get that published. And that's the slow part, that process, as we all know, can take quite a few years before you get that long term data. You can collect the patients, but it can be 3, 5 years before you know whether it's been a real success. So, the simple answer is really yes, most people are aware of it, but I guess it's known whether that surgeon does these kinds of things. That's the bit of homework that I guess you need to do.

Steven Bruce

You said you had four cases for us, but we don't have an awful lot of time left, would you care to do your hip case next?

Joyti Saskena

Yes, let's move on to that. So, 19-year-old female, she's Afro Caribbean in origin, she's actually originally from Kenya, and she's studying nursing, actually in Toronto. But she presents with bilateral sort of hip pain, she's had a number of sickle crisis, so she has sickle cell disease, has both the genes. So, this is quite a common thing for her, she's very used to it when she gets a crisis but the new thing on this occasion is that she started developing bilateral hip pain. She has family in the UK, so they actually brought her back here and then we saw her. And these are her plain x rays. Again, nothing really impressive to see on those plain x rays. I'll just move on to the MRI scans. And hopefully your viewers will be able to see these are both T1, T2 two images of MRI. And it shows again in the superior weight bearing area is that sort of, on the top left one for example, you see that little white crescentic circle, to a lesser extent on the left hip, on the T2 images on the MRI on the right of the screen, again, you can see both hips are sort of lighting up. Yeah, so we grade these MRI scans, we use a classification called the Ficat classification. And essentially, what we're looking for is, we know that the etiology is the sickle cell disease, it causes avascular necrosis, that interrupts the blood supply to the femoral head and the reason why it often affects the femoral head because of these end arterioles. They're kind of looped arterioles, you get little sickle cells, which are effectively abnormal

blood cells, they form clots, they get stuck in these arterioles, the blood supply stops, the bone effectively dies, the cartilage dies. Now if you leave it too much, then eventually you'll get wear and tear, joint space narrowing, arthritis, you know you've gone beyond the realms of where non replacement therapy can work. We're at a stage where now she's still got a reasonable joint space, as you've seen on those x rays, she still has cartilage, and therefore we need to get blood supply back. What would we typically do? Can you see that? It's just a picture of core decompression, which is very crude, you're drilling into the femoral neck and you're relying on the bone around it to bleed and help bring blood supply back there.

Steven Bruce

Is that a long-term solution? It sounds as though it would be very temporary.

Joyti Saskena

It can be if you get it early enough. If you get it into the what we call grade two, in other words, there's no joint collapse, it can be enough. But the issue is, is that as you correctly imply sometimes it doesn't work, and then they will just go on to collapse and then you get to that point where you're ending up having to replace. We've done something slightly different here, in terms of, we've done a core decompression, this is a device called the X-REAM, which is effectively a fancy drill that goes in straight but then expands, you can see that sort of balloon shape at the end, it has a sort of a fan shape that opens up so you can really get, so you can use a minimal hole to, the bigger the hole in the neck, the risk of fracture and those things are there. So, we don't want to drill a big hole into neck, we want the smallest hole in the neck, but we need to drill that sort of bone where it's effectively died, the subchondral bone. So, this allows you to do it, it's called an X-REAM and it effectively just opens up like a fan. And then on top of that, what we can do then is to backfill that area, again, with a calcium phosphate, just like with that subchondroplasty case, calcium phosphate, which you inject into that area and it fills that track and that effectively acts as a scaffold to allow the new bone to grow into it, through that process of what we call creeping substitution. And again, because she's 19, we generally expect her biology to be good, it dramatically takes away her pain. So, within a day, that procedure becomes a success in that that pain that she gets from the avascular necrosis literally goes straight away. And then it's just a process of that bone healing and filling in. And you haven't burned any bridges here, you still can, it's just calcium phosphate, it will become bone, you can still do something later on, a replacement or anything like that or more core decompressions if it's required. So, these are just some, another sort of case in the hip, which is a biological way to stimulate bone healing. If you got to the point where the cartilage is destroyed, then obviously, this wouldn't be appropriate.

Steven Bruce

I was just going to say, very useful from our perspective to take into account sickle cell aspect of it when a patient presents to us with their symptoms. Lucas asked what size drill bit we should use for that procedure? But building on that, your X-REAM actually must have been about a quarter of the width of the neck of the femur, it's still quite a substantial hole isn't it?

Joyti Saskena

It is, it is, and you sometimes have to protect those patients. Obviously, what you're seeing is a two-dimensional representation. So, we know that the neck is strong and generally, if this was in a 40/50-year-old, because we do for example, someone who has a fractured neck of femur where we actually put screws, cannulated screws in, it's not an uncommon procedure, but her bone quality would be such that it should take it but you would warn them of that small risk of neck fracture if she was to have a significant fall or trauma. If you're concerned obviously you can protect weight bear them, I mean generally she'd be on crutches anyway for a period of two to three weeks just for comfort. But yes, it is a risk. But fortunately, not common in that age group.

Steven Bruce

Someone who is appropriately enough calling themselves Knock Knee asks, how much focus advice do you give patients regarding nutrition and lifestyle to help the body heal?

Joyti Saskena

I think those are real key factors. For me surgery is just one facet, I would never do, I don't think there's any surgery I would do without those three facets of the rehabilitation, both pre- and post-surgery, and as you correctly point out the lifestyle changes. Because specific things like osteoarthritis, if you're not going to change your lifestyle, yes, you can replace their knee but what about the other knee? What about their hips? So, you've got to get them to change their mindset. And that may be psychology, really getting into the bottom of what is it that's bringing on those things, why are they not able to lose the weight or push themselves with the exercises and that sort of thing. And also changing habits, making sure, we always say when you make that decision for surgery, again, I'm concentrating on replacement surgery, we use it as a pivotal sort of stepping stone to say well, if you're going to get that bit of your life sorted out, let's get other things sorted out. And that whole holistic approach, again, is really our focus to try and make sure that other joints are okay, other conditions are okay, and making sure that we talk and refer to our colleagues and try and deal with the whole patient.

Steven Bruce

Thinking again, longer term, this 19-year-old girl, well, young woman, she's obviously more prone to osteoporosis, because she's female, I presume the sickle cell must affect that as well. Will she be more vulnerable as a result of this procedure when she gets older or will it be so solid by then the risk factors are the same?

Joyti Saskena

So, this as you, I think, imply that this sort this problem out. Now, the sickle cell, there's no cure for that, we all know that, you're just managing those crises. And therefore, there is no guarantee that another, sickle cells just abnormal blood cells that sort of have a propensity to clot or form clots. So another area of that hip bone can be affected. Likewise, it can affect other large, typically large joints, shoulders, knees, it can affect. It goes to the hip, because of these kind of looped end arterioles. It's just where blood flow is sluggish in that area anyway and then on top of that you've got a clot floating around, it tends to stay there. So that's why the hip is so commonly affected with, with sickle cell, but you're right, it can affect it. From a

density point of view osteoporosis, obviously, a qualitative thing, I don't know if there's any sort of significance with that, but more to do with just her general hormonal levels and endocrine sort of aspects, as opposed to the sickle.

Steven Bruce

Right. So how is this young woman progressing at the moment?

Joyti Saskena

So, she's doing good, I mean, she's now over a year out and she's back in Canada, she sends me an email every now and again. She's pleased, I think she's used it as an opportunity to manage her sickle well. And yes, she's doing good.

Steven Bruce

Excellent. Joyti, we're at the end of our time and I'm very grateful as always that you've given up so much of yours, even though you are confined to a cupboard, it seems, back at home while you self-isolate. I certainly wish you and your wife the best, I hope you get out of isolation soon. I'm sure that since you've both been vaccinated, you're unlikely to be affected by this disease yourself.

Joyti Saskena

Yeah, it's been a pleasure and hopefully look forward to the next time.

Steven Bruce

Thank you very much.