Articular cartilage grafting in the UK – Ref 256

with Ian McDermott

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TRANSCRIPT

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Steven Bruce
Good evening. Welcome to the Academy of Physical Medicine for the second broadcast this week. My guest this evening, he's been on the show twice before, he is consultant orthopaedic surgeon Ian McDermott, his specialist subject is knees. And when I looked him up on the internet, I counted about 30 publications, which is either the sole author or the lead author, almost all of them about knees. So I doubt there's very much he can't tell us about that. He's here to talk about chondral grafting and the state of affairs in the UK today. So I suspect that will be of interest not just to you, but to many of your patients. Ian, welcome to the show. Thank you for coming back and joining us for a third time.

Ian McDermott
Thanks very much, Steven, that's kind of you to invite me to be here.

Steven Bruce
I hope I didn't do you any injustice by not doing a fuller introduction there. I mean, you've been a consultant now for what, 23 years or something, haven't you? And you were the youngest trustee of the Royal College of Surgeons as well, at one point, so you're pretty eminent in your field. I think it's fair to say.

Ian McDermott
It seems ironic to use the word young now. I don't know that I would use the word young anymore. You don't have to give some long intro. If I want to introduce myself accurately and succinctly then it's my name is Ian, I do knees. That's it.

Steven Bruce
Well, I was gonna say, actually two of the papers, they're not the only two, but two of the papers that you're responsible for are not about knees. One is about fat embolism syndrome, and the other is about thyroid cancer, isn't it? Papillary thyroid cancer. Now I can see the connection with fat embolism syndrome because that does occur as a result of Orthopaedic Surgery sometimes I understand well, I'm no expert in that. But the other one, cancers. How did you get to write papers on that?

Ian McDermott
Because, well, when you do your surgical training, you have to go through different specialties. So I did not just Orthopaedics, I did a lot of general surgery, did ENT, did plastics, Urology. So you get exposure in lots of different surgical specialties in your early training, before you then sub specialise in just one specialty, which for me was obviously knees. Or sorry, for me was Orthopaedics. And then when you're into a specialty like orthopaedics, then when you finished your general or your general specialty training, that's when you can sub specialise. So that's when I sub specialised purely knees.

Steven Bruce
Right. Okay. So, you said that the state of play in the UK at the moment is a mess. Why is that?

Ian McDermott
It's a long story, but articular cartilage grafting and kind of the most cutting edge, the best surgical techniques, they've evolved over the last 20, 30 years, and the regulators, people like NICE, for example,

have lagged way, way behind. And what we've been allowed to make available to patients in the UK has lagged behind. And the problem we're facing now, I mean, I'll talk about it later when we talk about articular cartilage grafting, but the problem is that it's barely available in the whole of the UK now. And suddenly the insurance companies just won't even cover it. Some insurance companies will, some won't. It's like their bat, their ball, their game, their rules, and it seems entirely arbitrary and kind of without logic or reason as to why some people won't actually allow it, apart from the obvious, which is it's just a cost containment exercise for their own benefit.

Steven Bruce
Yeah, presumably they must have done the sums on what the alternatives are. And the alternatives are going to cost money as well. And the outcomes might lead to further surgery sooner at a later date I imagine why am I eating into your presentation?

Ian McDermott
No, that's fine. I think yes and yes, if you leave somebody, the longer you leave it, the worse it gets, the poorer the outcome. But no, in as much as from an insurance company's perspective, if they just leave somebody, well, then great, they don't have to pay for it. And maybe the patient will just give up, maybe the patient will go elsewhere, try and go down the NHS or self-fund, or maybe in a couple of years' time, they won't have the insurance policy anymore. Now, the problem is that insurance companies are a little bit like the NHS, they work on short term targets. So, the most important insurance is corporate insurance and is for the insurance companies from their perspective. And big companies renew their insurance every year, and they go through brokers. So all the insurance companies really care about is their annual targets and renewals. And then if you look at people who are working within insurance companies, well, guess what, they're all on salaries, and they've all got targets. And so again, they all care about short term targets. Whereas if you take somebody like you, or I, you know, we're potentially going to get to know a patient and know them for many, many years. And our top priority is the long-term best interests of the patient. So we're fighting from two completely different perspectives.

Steven Bruce
It's disappointing, isn't it? I mean, the NICE guidelines are supposed, I suppose, in many cases, to look at the quality-of-life years as a result of whatever intervention it might be, but they don't change very quickly, do they, and don't necessarily reflect current best practice.

Ian McDermott
Let's be really clear and honest about this. NICE really stands for the National Institute of Cost Effectiveness, not Clinical Effectiveness, and there's a huge difference between the two. And it's certainly not clinical excellence. So it's all about money. It's all about qualities, how much money does it cost to give how much quality-of-life improvement but that's absolutely fine when it comes to a population - approach. Problem is none of my patients there are a population, they're individuals within a population and what's in the best interest of the population, may well not be in the best interest of a particular specific patient. So we treat patients, we're not epidemiologists or public health people, sitting in little offices who have never seen a patient for the last 20 years. We're clinicians, and we treat the individual in front of us. And that's a huge problem when discrepancies like that exist.

Steven Bruce
Yeah, must be hard work explaining to patients why you can't give them what you think is the best treatment. I did mean to ask just before you start on, you know what you've got prepared for us this evening, though, you work, I think almost entirely now in private practice, don't you, you've given up your NHS work?

Ian McDermott
I gave up the NHS well over 10 years ago, so I'm full time private now.

Steven Bruce
So how much latitude do you have as a consultant to do whatever you think is best for your patients, even if it's not in keeping with the current NICE guidelines?

Ian McDermott
Guidelines are guidelines, protocols are other monkeys who haven't the faintest idea what they're doing, and they just didactically follow orders with no thought whatsoever. That's a protocol. A guideline is a suggestion based on evidence and it helps guide people in their decision-making process on the understanding that there are always people who are a bit to the left a bit to the right. And what's right for the individual may be different. So guidelines always include caveats, and they're never, they should never be considered didactic.

Steven Bruce
I was gonna say, how do your insurers regard that, you have something like a 93 or 95% success rate, but that means there's 7% who don't succeed. If they were to complain about that, would your insurers say well, you weren't following NICE guidelines, therefore, you shouldn't have been doing it?

Ian McDermott
No. Articular cartilage grafting and, you know, we'll chat about it later, has got about an 80% success rate at five-year follow up, not 93. And, you know, that's part of the consent process. You've got to be pretty stupid if you think that there's any such thing in the world as, it's safe, its effective. There is no such thing in the whole of medicine, in any aspect of medicine. There's no such thing as an intervention that's 100% safe. There's no such thing as an intervention that's 100% effective. It's just complete fantasy, even an amputation, you know, that may not be successful, the stump may get infected, they may have phantom limb pain, you may have stump problems, you know, even an amputation cannot be called, cannot be guaranteed 100% successful. So it's all about patient consent. And consent is about informed consent. So our job is to explain to the patients, first of all, what they've got, then what their options are, and then the pros and cons of those different options. And then our job is also to guide the patient in the decision-making process, if they require guidance. And then it's only once a decision has been taken and only if that decision involves surgery, that you're then going to do the best job that you can, technically. So there's no such thing as guaranteed outcomes. And explaining that to patients is an absolutely critical part of the decision-making process. So these guidelines from NICE, a lot of insurance companies or some, one insurance company in particular, hide behind NICE, which is very, very inappropriate, and quite disingenuous, because NICE, it has no statutory remit within the private sector whatsoever. It's an NHS organisation, and it assists the NHS in funding decisions. And that's all it is. So it should not be used

as a tool to restrict patients' access to appropriate treatments within the private sector. But some insurance companies do exactly that.

Steven Bruce
Just taking a slightly contrary stance for a second, we've certainly had consultants on the show in the past, and you might have been one of them, I can't remember, it's such a long time since you have been on the show before, who have suggested that there are surgeons out there who are inclined to recommend whatever it is they do for a living, not always necessarily in the best interest of the patient. Do you see a lot of that?

Ian McDermott
Do I see a lot of it? On a not infrequent basis, I get patients coming to see me. But about 50% of my practice is second opinions. And a not insignificant percentage of those second opinions are patients where I disagree with the diagnosis or recommendations or treatment of whichever consultant they may have seen previously. And you're absolutely right, it's horrific to have to say it in this day and age, but there are undoubtedly a number of surgeons, a not insignificant number of surgeons out there who I would say their decision-making process is suspect at best. And I can't help but wonder whether the decision is in the consultant's best interest rather than the patient's best interests. And whether it's for nefarious reasons, rather than just incompetence. Bit harsher. Scary. And that's why, if you're a clinician, if you refer a patient to a specialist, then by God, you really ought to know that specialist, you ought to know, are they good technically, are they good in their decision-making process. Are they a good human being? You can't be a good surgeon unless you're a good doctor and you can't be a good doctor unless you're a good human being. And just like all human beings are not good. All surgeons are not good. So you have a responsibility to protect your patient from bad doctors, bad surgeons, bad medicine. And it's part of the referral process.

Steven Bruce
We osteopaths and chiropractors have the same sort of thing in our statutory guidelines. And certainly, the stakes are somewhat higher in your profession than they are in ours. But nonetheless, we constantly wring our hands over whether we're getting a patient back too often or aren't recommending too many courses of treatment for their own best interest. Because we're conscious of how much they have to pay for, because very few of them are being paid for by insurance companies. Anyway, sorry, I'm waffling on when you've got a whole lot of stuff that you wanted to tell us about. So shall we start on with that?

Ian McDermott
Yeah, let me just share my screen. And could you just let me know Steven, can you see that?

Steven Bruce
Yeah, we've got your full screen up at the moment.

Ian McDermott
Brilliant. And can you see my laser pointer on the screen?

Steven Bruce
Just for the gallery's benefit, I've lost Ian's audio.

Ian McDermott
Okay. I can still hear you, Steven. Would be useful to know whether anyone can hear me. Yeah, I can hear you.

Steven Bruce
I don't know if the audience can because I can't hear you now. Okay, somebody's told me they can hear us both. That's fine.

Ian McDermott
They can hear us both, brilliant. I think you probably need to hear me if you're going to be able to ask questions and interject etc, etc. So while Steven is hopefully, hopefully about to... You can hear me? Brilliant. Right? So let's get going then because there's a lot to get through. So this thing is about articular cartilage but you cannot talk about articular cartilage in isolation, because articular cartilage is a structure in a knee with other important structures. So, there are other things that you have to talk about in relation to articular cartilage, and we'll cover those as well. So what is articular cartilage? Well, everybody knows it's that smooth, white, shiny, glistening layer of tissue that covers the joint surfaces. What's remarkable about articular cartilage is that it has the lowest coefficient of friction of any substance known to man, which is incredible. It just shows how amazing either God or nature are, depending on one's beliefs and perspectives. So, it is an incredible structure. Until it goes wrong, because it has no blood supply. And therefore, the cells in the articular cartilage, which are mainly in the basal layers, are relatively sparse and fairly metabolically inactive. So articular cartilage has very poor, limited healing potential. There is a minimal amount of healing that can sometimes happen if you have for example, a clean cut in the cartilage. But generally speaking, articular cartilage does not repair, does not regenerate, does not grow back on its own. So what about the symptoms and signs? Well, this is actually quite difficult, because the symptoms and signs of articular cartilage damage are really quite non-specific. Now I'm not talking about articular cartilage wear and tear where you've got widespread cartilage loss and you're developing arthritis, I'm talking about what if you've got a focal patch of damaged, unstable or missing articular cartilage in a joint? Well, you'll complain of medial or lateral joint line pain approximately, and the patient may point to the side of their knee, they may have some clicking, they may have some catching, they may have some locking and their knee may swell. Well, every single one of those symptoms also applies to meniscal tears. So it really is quite nonspecific. That's why, when it comes to defining, diagnosing articular cartilage damage, and defining the severity and extent of any potential damage, we absolutely rely on imaging. Now, if somebody comes in with an arthritic knee, and their x ray looks like this, then you do not need an MRI scan. It's blatantly obviously arthritic, and we're talking about joint replacement surgery. These are not the kind of patients we're talking about for the rest of this talk, I'm talking about younger patients with focal areas of damage. So for that, you need an MRI scan, an MRI is an absolutely invaluable, critically important mandatory tool for diagnosing exactly what's going on in a knee. Again, that's excluding older patients with severe arthritis, fully blown arthritis, which is obvious on an x ray. So here's an MRI scan of a knee. And this is a high res 3d scanner. If the picture is a little bit blurry or low res, that's purely because it's just my picture on my screen coming through your screen, but we can get some very, very high-quality, high-resolution pictures now, specifically on three Tesla, three T scanners.

And if you can see this, this is a medial femoral condyle. And there is a chunk of articular cartilage missing. So here's the bone. The articular cartilage is this thin, pale, grey layer of tissue on the joint surface. The black line is the subchondral bone plate. And we come around to here, there is a patch, a chunk of articular cartilage missing. And you can see on this next view, it's a little bit wider on this view. So imaging, critically important

Steven Bruce
Before you go on, I'll mute my sound everything so that I can speak. When you looked at that image there, which MRI are you looking at? Are we looking at a stir sequence there to show inflammation? Or is that simply T two I'm thinking?

Ian McDermott
Yeah, this is a TT picture. It's my favourite picture. They say T one's good for anatomy. T two is good for pathology. This, almost everything I look at is nearly always on a T two scan. So this is a fat, suppressed, spin echo blah, blah, blah. You know, it's the one where everything is more black and white, not the one where everything's different paler shades of grey. And please don't ask me to explain the physics of exactly how MRI works because it's still after all these years a bit of a mystery to me.

Steven Bruce
I think that will be very reassuring to a lot of people watching me.

Ian McDermott
I've got my own simplistic little explanations in my head. So if somebody forces me to explain the MRI scan, I can kind of explain it a bit. But I think I'm making half of it up because I don't really understand the physics, it's complicated. So yeah, arthroscopy. Arthroscopy is not just therapeutic, it's also diagnostic, and it's not infrequent to find articular cartilage damage either coincidentally, in which case, it may have just been genuinely coincidental, and it may be asymptomatic, or to look in somebody's knee and think there might be a little bit of cartilage damage, and to find out that it's a hell of a lot worse than you thought it was. So, arthroscopy is invaluable, therapeutic and also diagnostic. So, this is a picture of an arthroscopy. You can see I'm probing the medial meniscus in the medial compartment. And that meniscus is intact. And the articular cartilage is that smooth, white glistening layer, so on the joint surfaces. So this is somebody with grade three cartilage damage, that didn't show up particularly well on an MRI scan. On the MRI, the cartilage looked pale, but it looked like it was still present. But when you do an arthroscopy, and when you probe that cartilage, your probe just disappears into these deep fissures and you can see there's unstable flaps. So that's grade three with fissures down to the bone, articular cartilage damage on the back of a patella. Now, a good analogy is, if you go to a dentist and they think, have you got a cavity, well, they're not just going to look in your mouth from a distance, what they do is they get a little mirror, and they get their goggles, their magnifying glasses, and they use their magnifying glasses and their little mirror to look inside your mouth. But even that's not enough. So that's the equivalent to an arthroscopy, but that's not enough. They also get a little dental pick and they just poke. And if your dental pick disappears into a cavity, well, you know, there's a cavity. So arthroscopy is a little bit like that, you're looking much more closely. Remember, an MRI scan is not a picture, it's a representation of the water content in different locations and different pixel locations. It's not a photograph. Whereas arthroscopy is a photograph, it's real life and very, very important that you can actually probe things, so you get that

tactile information as well. So if you've got unstable rough articular cartilage damage in a joint, and if the patient is symptomatic, and if you find that at the time of an arthroscopy, what you can do is called abrasion, chondroplasty. Now, this is an arthroscopic shaver, looks massive, it's not because it's only 3.5 millimetres diameter, oscillating jaws at the end, hollow tube, trims tissue, sucks it out the knee, it's incredibly dangerous when it comes to articular cartilage. So what I'm doing here is literally just tickling the surface of that cartilage very, very cautiously and gently, gently taking away the unstable flaps.

Steven Bruce
I think Ian, when you do this, you have a much better image of what's going on than we're seeing.

Ian McDermott
It depends on, I can't see how bad your picture is. I'm sorry.

Steven Bruce
It's flickering from static shot to static shot, I take it yours is very much real time and you can see exactly what your probes doing.

Ian McDermott
Absolutely. It's real time and it's 4k HD and it's on a great big screen, great big screen in theatre. So yeah, we see it pretty accurately. So that's abrasion chondroplasty. Now, if you think of articular cartilage damage has been like flaky paint on the rusty gate, and there's bits peeling off, so as your knee is constantly moving, your cartilage looses bits and you're breaking bits of, well, the abrasion chrondroplasty is like using an electric sander on that flaky paint to smooth it off. The problem being is that if you are not very, very careful, you can end up taking away lots of cartilage and causing even more damage. So if you imagine that you're going willy nilly on that flaky paint with your electric sander, then all of a sudden, before you know what's happened, you're down to bare bone on your rusty gate. So bare metal. So when you're doing abrasion chrondroplasty, you have to be super, super gentle, super patient and super delicate. I tend to avoid it as much as I can. And the reason for that is that the main thing that I rely on is radiofrequency chrondroplasty. Now, this is a radio frequency probe, and it's called an arthro care super turbo vac 51. Great name. And there are two little electrodes in the tip. And they superheat the sodium ions in the salt water that we're pumping around the knee, and it creates a little sodium plasma at the tip. So it's like a little lightsaver or like a little welding arc at the tip. Now if you just get that probe and you stick it against the cartilage and turn it on, it will burn straight through and it'll go straight through to bone very quickly. So what you do is, little bursts of energy, hold the probe away from the surface of the cartilage and just bit by bit, it melts or kind of it actually evaporates the surface and what you're doing is smoothing things off and stabilising it. So, back to the paint analogy. This is more like using a blowtorch on your flaky paint to melt the surface, stick it down, smooth it off and stabilise it. Now, if you do that, it tends to reduce pain, it tends to stabilise the cartilage surface, it stops it flaking away so quickly, it does not make the cartilage grow back, very importantly. And if you go too deep, if you just keep going because you want to get it smoother and smoother and smoother, well then sooner or later there'll be nothing left. So you have to be very, very cautious and conservative with how you do radiofrequency chondroplasty, it's a good thing to stabilise and smooth off the cartilage. But again, you've got to be very, very patient and very delicate with it. And that is for unstable, partial thickness, cartilage damage. Here's a really, really bad one. So this is like crazy bad. This is somebody's medial femoral condyle and this cartilage is

just falling apart, it's beginning to flake off and delaminate. And that's kind of horrendous. Now, very interestingly, if you simply stabilise that damaged cartilage with a radiofrequency probe, then in about 40% of patients, they actually report that their knee ends up feeling good enough not to need anything else in terms of anything bigger. So they end up not wanting to take things further. So that's the damaged cartilage there. And then what we do is with the radiofrequency probe, just smooth things off as best we can, very carefull, bit by bit. And if you keep on going, you'll get down to bone and there'll be nothing left. And you want to stabilise the cartilage, not remove it. So very carefully, bit by bit, smooth off that damaged cartilage. Not sure if the video is going to catch up with us. And as I said, if you get that cartilage smooth, if you get that cartilage stable, then it's got a pretty good chance of reducing the patient's symptoms, help them keep their knee going for longer and delaying the time when anything else bigger might need to be done. But it's not a cure per se. It may reduce symptoms, improve function, buy people extra time, but it's not restoring the knee back to what it was. It's a tidy up. So the next question is, what do you do if there is full thickness cartilage loss? Well, the first option, which is fairly easy, straightforward, cheap, minimally invasive is called microfracture. Microfracture has been around for decades now. And it was first popularised by Dick Steadman from Vail. So if you have a full thickness defect, but if it is a small focal defect, and by small, the definition is less than two square centimetres, and that doesn't mean two by two, that's four. So we're talking about roughly 1.4 times 1.4 centimetre patch is roughly two square centimetres, and that's pretty small. And if there is a decent shoulder of surrounding articular cartilage, then microfracture might be appropriate. But those stipulations are really, really specific and clear. So with microfracture, you scrape away what might be left at the calcified cartilage layer at the base of the defect. And then you punch little holes with a metal pick. So it's literally just a metal spike, and you puncture the subchondral bone plate. The subchondral bone plate is acting as a barrier. And all the blood and bone marrow and stem cells are underneath that within the bone. So what you're doing is, by puncturing the subchondral bone, you allow the bone to bleed and you get a blood clot forming in that little crater. That blood clot is rich in stem cells from the bone marrow and the Americans call it a super clot. And as it heals, what happens is it tends to form fibrocartilage, and fibrocartilage is halfway between normal cartilage and scar tissue. It's not normal highline cartilage, but it's better than bare bone. So microfracture is reasonably good for small, focal, contained defects. This is quite a big defect. This is looking into the front of somebody's knee, unless it is a patch of full thickness articular cartilage damage in the trochlear groove at the front of the femur with very unstable flaps of cartilage and with some partial thickness cartilage damage on the back of the kneecap. So we stabilise the edges of the defect using the radiofrequency probe. And then we puncture little holes into the base. And this is a micro fracture pick. And this is a really old video. This is a knee that I did literally years and years ago and when you puncture those little holes, if you watch really carefully, I hope you can see on the video, if the quality is good enough, then what happens is, as you're hitting a hole, out of some of the other holes, you might, if you're lucky, see a little yellow blob come out. And that is a blob of bone marrow. So if you look at that previous hole, there, see that yellow blob? That's bone marrow. And as I put the next hole in, you might see a little blob of bone marrow coming out. If we're patient or not.

Steven Bruce
It looks as though it's quite easy to punch holes in that bone plate.

Ian McDermott
I'm hitting it with a hammer. Yeah, it's easy if you've got big hammer. And if it's difficult, get a bigger hammer. Yeah, that's the mantra for orthopaedics, isn't it? So no, you can't see any little yellow blobs. And the reason it's not bleeding in here, the reason you're not seeing the whole thing filling up with blood is simply because we've got the water pressure. Turns out, we're pumping pressurised saline through that knee, and that has a tamponade effect. So there you go. Little yellow blobs. Do you see them coming out? You might have missed that. So that's bone marrow. So that's microfracture. But we've moved on. I mean, that's old school. And a few years ago, we went from using a micro fracture pick, which basically fractures the bone, it impacts it and it creates a hard cone of bone which actually inhibits bleeding. So we moved on to something called micro FX, which is using a flexible drill bit to drill little holes, and even that's old fashioned now. So the current thing that we use is nano fracture, or nano drilling is another way of putting it. And that's a 0.9-millimetre diameter, flexible drill bit. And what we do is put much, much smaller diameter holes in the subchondral bone plate. And there's very good German research that shows that that gives much better result because it damages the subchondral bone plate less. So this was a difficult case. This is somebody with a displaced locked bucket handle tear of their medial meniscus, and that's the meniscus I'm probing there with a horrible big patch of full thickness, cartilage loss, damage on their medial, femoral condyle. And that is a big, big patch. So first thing we did in this case was to reduce that meniscus back in place, and to stitch that meniscus and do a meniscal repair. Second thing we do is to smooth off and stabilise the edges of that hole in the cartilage. So that's radiofrequency chondroplasty to stabilise the edges of the defect. And then next, what I'm doing here is the nano drilling. And that is to drill lots of little holes on the surface of the bone. And you can see these holes are significantly smaller. And we put kind of a bigger number of them compared to what we used to do for microfracture. And once you finish doing that, that's what you end up with, you want the surface of the defect to look like a pepperpot, you want lots of little holes. And this is actually quite a nice picture because where that meniscus has been reduced and stitched back in place, you can see blood under the meniscus. And that's more the little holes where you put the meniscal stitches in and that's really, really good. Because the more blood there is around the meniscus, the more likely it is the meniscal repair will heal. And this is at the absolute upper limits of what you'd ever consider appropriate for nano drilling in terms of the surface area. And it's like really, really at the upper limit.

Steven Bruce
If I can interrupt just for a second, Carrie sent in a question a few minutes ago, just asking why such a small discreet patch of cartilage would be damaged in that way. Why would there be a chunk missing rather than more generalised wear?

Ian McDermott
There's lots of different reasons, it may be an osteochondritis dissecans lesion but that's different, because that's bone and cartilage. It may be traumatic, so you get blunt trauma. It may be that you've got meniscal damage, so you've lost your meniscus, therefore get increased contact pressures. Focal defects like that are quite often traumatic, they're not just wear and tear. However, sometimes when you're developing articular cartilage failure, what can happen is the cartilage can crack and then as the crack propagates, you end up with an unstable flap. And then sometimes that flap may break off and leave a focal patch of cartilage damage. And part of the skill in articular cartilage surgery is patient selection in terms of identifying which of those cartilage defects are genuinely focal, as opposed to, which

then represents a patch of articular cartilage loss that is simply the beginning of the end for that knee. In other words, there may be a little hole, but it's simply the beginning of all of the articular cartilage beginning to wear away or flake off, delaminate, fail, etc. And if it's the latter, and you start trying to do articular cartilage grafting in a knee where the whole of the joint surfaces is beginning to kind of fail, well your cartilage grafting will fail. Cartilage grafting is not for generalised osteoarthritis in a knee. Is that okay?

Steven Bruce
Yeah, that's fine. Sorry, I'm keeping quiet because I'm getting slight problems with my audio and I'm having to mute one system whenever I speak, otherwise, I get endless echoes coming up. I'm fascinated and I will feed in questions from time to time but otherwise I'm gonna keep quiet.

Ian McDermott
Okay. So then, everything we've talked about so far, we've talked about radiofrequency chondroplasty or abrasion chondroplasty, radiofrequency chondroplasty for partial thickness damage. We talked about microfracture, old school, modern version, nano drilling for small focal defects. The next question is, what do you do if you've got a large full thickness defect? Well, you've got options. You can do autologous chondrocyte implantation or, and that's where you take cells, cult them in a lab, six weeks later, reimplant them. And if those cells are cultured into a membrane, that's called MACI. There's AMIC and I use something called chondrotissue and I'll explain that in a minute. Or there's focal resurfacing with actual metal implants. Or you can kind of go to the kind of final resort stuff, which is partial and total knee replacements. So what is ACI or MACI, this has been around for decades, originally developed in Sweden. And what you do is a two-stage procedure where you scrape, the first operation is to scrape some cartilage off the edge of the joint. And then you send that cartilage off to the lab. And it used to be done by a company called Genzyme. They used to be the biggest. And they take about six weeks to culture the cartilage cells, and they multiply them into about 50 million cartilage cells, and they send them back to you. So six weeks later, you can implant those cartilage cells. First generation ACI, you used a little patch of periosteum. But that was subject to quite a lot of overgrowth. So second generation ACI was when people started using little collagen patches instead. And then third generation ACI is when the cells are actually impregnated into a collagen membrane. So you send off the cells, six weeks later, you get a living membrane with living cells in, in a culture serum. And they're sent back to you and you implant it. Now, that process is staggeringly technically demanding, and just the cell culture alone costs 10,000 pounds or used to cost 10,000 pounds. And it requires two operations instead of one operation. And in 25% of cases, the patient ends up needing a reoperation for either a partial failure of the graft or overgrowth. So there are lots and lots of issues with that.

Steven Bruce
Can I assume it's done arthroscopically, though, Ian?

Ian McDermott
No, the problem is, if you do this, some people used to do this arthroscopically and what the research showed is that the water that you're washing around the knee, so you can see what you're doing, washes away the cells. So this has to be done through at least a mini arthrotomy. So it has to be done open, doesn't necessarily require a great big knee replacement incision. But it does require open surgery. So

open surgery, two ops not one op, 10,000 pounds just to culture the cells, that does not include the cost of the first or the cost of the second operation, that's purely to culture the cells. And the overall success rate is in the region of about 80% at five-year follow up. So it's reasonably good, but it's far from perfect. Now, this is where the mess started to happen. So NICE in its great wisdom refused to accept, endorsed, that's a good word, they refused to endorse or recognise ACI as a procedure within the NHS. So it wasn't considered cost effective, because it's so expensive. Doesn't mean it doesn't work. It's just about money, cost effectiveness. So they wouldn't endorse it. Therefore, if it wasn't NICE approved, you couldn't do it in the NHS outside of clinical trials. And the insurance company said, well, if the NHS bans it, well, then we're going to ban it, which is completely nonsensical because it's a financial decision based on cost. It's not a clinical decision based on effectiveness. So what happened is because NICE basically effectively banned it, it disappeared in the NHS, it disappeared in the private sector. And the companies, therefore, basically withdrew. So all of a sudden, we were left with no options for cartilage grafting. Then, in the wake of that, what then happened is, I'll come back to that picture, I'll come back to it. What then happened is people got innovative. And there was one certainly published about the fact that he put in a collagen scaffold, which was supposed to be part of the ACI process, but no cells were available. So we just put it in the scaffold alone with no cells. In the end, the patient actually regrew cartilage, which was a little bit of a surprise. Strange thing to do, the first time anybody ever did that, that it was done. So that then begs the question, just how many cells do you need? Or do you even need cells at all, do you need to do the cell culture and off the back of that, something called AMIC was developed. And AMIC stands for autologous membrane induced chondrogenesis. So this is a single stage procedure. Unlike MACI or ACI, it's a single stage procedure, and it uses a bio absorbable synthetic scaffold, and the one, there's different ones available, the one that I use is chondrotissue. And chondrotissue is a woven polyglycolic acid mesh, impregnated with hyaluronic acid, and it comes like a piece of fuzzy felt. So this is an example of open chondrotissue grafting as a single state procedure. And this is a girl's knee, who had loads and loads of damage, loads of problems. And she ended up with this great big, tear shaped, full thickness defect with bare bone exposed on her medial femoral condyle. So I've stabilised the edges of the defect, I've done micro FX drilling, remember that's now old fashioned nowadays, it'd be much, much smaller holes with a nano drill. But this is a historical slide. We then get that graft, we cut it to size, and we put that graft into the defect. And very, very quickly that graft soaks up the blood that's coming through. That's it. The graft has literally just been put on. That's the graft literally a number of seconds later, it soaks up the blood from the holes in the bone and that blood is rich in bone marrow, well, it is bone marrow, and there are stem cells within that bone marrow. And then, in this particular case, what I've done is pinned that graft in place with four little bio absorbable chondral darts. Then what we do is we cover it over with a biological glue, called Vivostat PRF. It's PRF which means platelet rich fibrin. And what we do there is, we take 120 mils of blood from the patient, spin it down and that gives us five or six mils of fibrin, autologous fibrin, which is like the sticky part of a blood clot, so it's like a glue. And it's got an eight times concentration of platelets in it and the platelets release growth factors. So that's the defect and the graft covered over with Vivostat PRF, A as a glue, B as a sealant to keep the cells in and C, it's bioactive because the platelets release growth factors which promotes healing.

Steven Bruce
Can I just interrupt just for a second, and I'm gonna go back to those research papers that I mentioned earlier on. Is this why there are those respiratory complications of orthopaedic surgery because you're inducing clotting in the process here, presumably with fibrin?

Ian McDermott
No, you tend to only get things like fat embolism syndrome. Very, very, very, very occasionally, with joint replacement surgery, that's pretty much unheard of. Fat embolism syndromes is mainly from fractures of long bones, we get large amounts of fat from the bone marrow, from damaged blood vessels, it goes into the venous circulation. So fat embolism syndrome is something associated with major trauma, not with, by comparison, relatively minor. I mean, this is major soft tissue surgery, it's complicated, it's fiddly. But this is not in the realms of something that is like ever likely to cause fat embolism syndrome.

Steven Bruce
Right. Thank you.

Ian McDermott
So that's the same patient with her MRI scan nine months later and here you can see the bio absorbable pins are still only partially absorbed. And what we've got now is a new layer of articular cartilage that has grown on the joint surface, that grows hyaline like cartilage. Now you got to be really careful when you hear comments like that, normal cartilage is called hyaline cartilage. So when you say hide in like, you're saying normal like, normal like means abnormal, it's like saying, my darling, you are almost perfect, it's exactly the same as saying you are imperfect. Okay, so when people say is hyaline like cartilage, it means it's abnormal. It's not normal cartilage, but it's better than nothing, it's better than bare bone. And again, that has got an approximately 80% success rate at a five-year follow up so broadly similar to ACI. Then we moved on to trying to do this arthroscopically. So there's a full thickness defect on a medial femoral condyle. Here's the micro-FX drill. So again, this is a slightly old video, micro-FX drill is drilling holes in the joint's surface to penetrate that subchondral bone plate. Then we size it, then we cut our graft to size, you place the graft in place, and then you pin it just to hold it in place. And then you fix it in place with bioabsorbable chondral darts. That's the first one. Here's the second one. And then once you've fixed it in place, straightaway, you see the graft is beginning to soak up some of the blood from the holes on the bone surface. The reason it's not gone completely red is because we've got the water turned on, the water's washing away cells. And that's a bad thing, not a good thing. And then I spray the whole lot over with the Vivostat PRF and PRF is amazing, you can actually inject it arthroscopically even if there's water there, it polymerises within fractions of a second. You just have to turn the water pressure down. And so what I'm doing is spraying this PRF, if we can get those little bubbles out of the way, spraying my graft with PRF and then what I do is slowly straighten, and then bend the knee and what I'm doing there is I'm spreading that PRF over the graft surface. So that's the first spray. And then I'll do it again, because there's a little bit missing, there's a little gap at the top. So I'm going to spray that with PRF, cover it over, the excess stuff just gets washed out the knee, and then again, bend the knee, straighten the knee very slowly, very carefully. And now that's beginning to look like a more stable surface. Again, if you're not used to knees that probably looks gross or grim or messy. But actually, if you're into knees, that's a thing of beauty. Because that PRF surface layer now acts as a sealant to prevent your synovial fluid or whatever water you're pumping through the knee at the time the arthroscopy from washing away all those cells. Now, here's another one. This is a patella. It's incredibly difficult if not impossible, to do cartilage grafting on the back of the patella through keyhole surgery, you're going to have to open up the knee and either the patella, so that's somebody's patella opened up everted, which means the same as dislocating it and there's a full thickness defect, I marked the edges of the defect with pen, you scrape away what's left of the scar tissue. So down to fresh bone, you do your drilling of the base, you put your graft on as a

template, so you can see where the edges are because the edges are red. You cut it aside, you pop it into your defect. I've pinned it in place with two chondral darts there. And then I use my Vivostat PRF as glue. And that's it with the graft in place covered over with my PRF.

Steven Bruce
When you evert a patella, it's clearly not designed to be everted. How much damage you're doing to the surrounding soft tissue? So the tendons?

Ian McDermott
Lots. Yeah, it's a nasty thing to do, you know, like it's the same approach as a knee replacement where you cut through the midline of the skin, through the skin in the midline. We're talking about a 15 to 20 centimetre cut for that procedure. So, probably 15 centimetres for that one.

Steven Bruce
I have one here I prepared earlier.

Ian McDermott
And then you cut longitudinally through the distal quads, and then you cut around the circumference of the patella. So you're cutting through the medial retinaculum and then you cut longitudinally to the medial side of the patellar tendon. And then you dislocate the whole thing by everting it towards the lateral side. So yeah, it's brutal. There's nothing small, the graft may be small and delicate, but my god, the surgery is invasive. So, again, this is not the kind of thing you would want done in your knee unless you really needed it.

Steven Bruce
Thank you. If I can just take you right to that hyaline like cartilage again, Pip has asked if you've got any idea what degree of pain relief does that give by contrast to proper hyaline cartilage?

Ian McDermott
The whole aim of cartilage grafting is to give somebody a pain free knee with good function. Often you don't achieve 100% pain free. If we achieve significant pain reduction, that's a win. If you get complete and total pain relief, well, that's brilliant. That's great. Okay, that's a bonus. In terms of function the aim is to allow people to do their daily activities and do exercise, so as to keep themselves fit and healthy, it does not mean that you should go back to sport or heavy impact pivoting type exercise. And that's a really, really important point and this is where I firmly disagree with a not insignificant number of other surgeons on this point. So some surgeons have on their websites or at meetings, they say, oh yeah, 72% of my cartilage grafting patients can get back to sport or 72% of my meniscal transplant patients get back to sport. Well done, not, because best analogy I can give you on that is it's like saying, oh great, look 72% of my lung transplant patients can get back to smoking, or 72% of my liver transplant patients can get back to drinking. Well, you know, this is salvage this is not curative. This is that same patient, this is his patella, a relook arthroscopy for other reasons at nine months post op, and that's the new tissue that's grown on the back of the patella. And looking from the top of the knee looking down, it's pretty good. But you can still see that area where the cartilage is a little bit different colour, it's a little bit rough, it's a little bit uneven, it is not perfect. So if you're performing salvage surgery to reduce somebody's symptoms, to

keep them healthy and to keep them going for longer, then if you pound that graft by going back to heavy impact exercise, all you're going to do is significantly increase the likelihood of it failing prematurely. So you can't have it both ways. It's like saying, right, I've got bald tires, so I'm going to go to Kwik. I'm going to have new tires put in my car. Then you say to Mr. Kwik Fit, can I skid on your forecourt on my way out? And Mr. Kwik Fit will say well, of course you can, if you want to have four new tires pretty damn soon. If you want your tires to last, drive sensibly, don't pound them. Now chondral tissue versus ACI. So there are pros and there are cons, ACI, two ops, chondral tissue, one op, rescope 25% in ACI patients. I don't think it's right to put no chondral tissue, I'd say less frequently. The actual graft when you're doing ACI, or MACI surgery is fiddly as hell and it's really delicate. The chondral tissue graft is far easier to handle in terms of the surgical technicalities, it's more robust. If you have an ACI graft, and you drop it on the floor, you're stuffed. If you have a chondral tissue graft and you drop it on the floor, well whoops, you've just thrown away a couple of grand, but you just get another one off the shelf. Tissue formed for both of them is hyaline like, and in both of them results are approximately 80% of five-year follow up. ACI costs about 10,000 pounds to culture the cells, chondral tissue, it costs about two to 3000, depending on which hospital it is. So roughly two and a half 1000 pounds for the actual graft. But don't forget, that's just the cost of the graft. You're also talking about the cost of two operations and the pain and the hassle, the risk, you know, for the patient with two ops versus a cheaper, single op if you do it as a single stage procedure with chondral tissue. And then, you know the crunch is, well can you get ACI or MACI in the UK? The answer is no, you can't, whereas chondral tissue is available. So what would I have, chondral tissue. Now I'm gonna flick back. Sorry, this is a little bit annoying, but let me flick back.

Steven Bruce
While you're finding the right slide, can I just interject with a question from Cali? Cali was asking about whether there is a benefit in a patella replacement rather than a graft, which is more successful.

Ian McDermott
Is the question, which is more successful?

Steven Bruce
Yes.

Ian McDermott
Is horses for courses, if you've got an old person with widespread cartilage loss, in other words, patellofemoral arthritis, we're going to be talking about a patella femoral partial replacement. If you've got a young person, and they've got a focal patch of cartilage damage or loss, well, you don't want to do a joint replacement in a young person with just a small patch of cartilage loss. So you talk about two completely different things. Patellafemoral replacement and cartilage grafting, you should never, ever look at a knee and think, should I do this or should I do that? You're talking about two radically different entities. Different pathology, different issue in different patients.

Steven Bruce
Thank you.

Ian McDermott
This is the slide I wanted to go back to and this is something that I've got a bit of a problem with. And there is a German company called CO.DON who have introduced into the UK something called spherox. It's like ACI, but it's not ACI. And it's not MACI. It's similar. They're culturing cartilage cells. So it is a two-stage procedure. And they provide the cells as these little spheroids or chondroids and what you're supposed to do is just inject them into the knee, allegedly, they stick to the bone surface, you don't have to stick them in, they just stick on their own. And then these little blobs, somehow miraculously grow new cartilage tissue. I'm extremely skeptical about it, just like you say, hyaline like is not the same as, this is like ACI. It's not ACI. I asked the company repeatedly for clinical evidence, and repeatedly, they failed to provide any. So I wouldn't personally, personally, I wouldn't touch this with a barge pole.

Steven Bruce
What's this called, again?

Ian McDermott
Spherox. It's called spherox from a company called CO.DON. And there are lots and lots and lots of different surgical options and different surgical techniques. And they've all got their antagonists and protagonists, they've all got some degree of evidence, some of it is, you know, really quite comprehensive and robust. Some of it is absolutely lacking and I put this one in the lacking category, and I personally wouldn't go near it. I might be proven wrong. But I probably have to wait another five or 10 years to find out one way or the other.

Steven Bruce
Where are they getting the cells from for this?

Ian McDermott
From the patient's knee, just like ACI. Sorry for jumping around. In terms of logic, I just wanted to do it in that order.

Steven Bruce
If I can interrupt this once more, because I think this will be quite separate for you. Alex has come in with a question. Well, more in hope I think than anything else. He says I don't suppose this kind of technique will work for multiple epiphyseal dysplasia because his teenage son has just been diagnosed with that.

Ian McDermott
That's something completely different. Sorry. Yep. So Nope. Apologies, Alex. But no, this is something that has a completely different pathological entity we're talking about here.

Steven Bruce
Okay, and Rupert said, what sort of average age are you suggesting would be appropriate for grafting in the knee?

Ian McDermott
I would say I'll answer that in a slightly different way, which is, what's the upper limit? Some people say the upper limit is 50. Some people are a little bit bolder, more adventurous, say the upper limits 55. The thing is, the older you are, the poorer your healing potential, the lower the probability of a good outcome combined with the fact that the older you are, the closer you get to that age where an artificial joint replacement is more appropriate. And again, the older you are, the more widespread the damage tends to be. So really, average age. I think a better way to say is upper age limit, upper age limit, probably about 50, which is a little bit ageist, but it's not ageist. It's just science. It's just nature. You get young 50-year-olds, you get old 50-year-olds. So you know, there's always a little bit of leeway in there. So, next thing to talk about and you cannot not talk about this is the meniscus. And time and time again, I've seen people who've come to me for a second opinion, who've had previous surgery, and somebody's done micro fracture in their knee. And there's no meniscus there. And that's just really silly. There's no point in doing micro fracture on the articular cartilage defect if there's no meniscus there to protect the articular cartilage. So we all know what the meniscal cartilage is are, two small C shaped elastic wedges of cartilage act as load sharers. People refer to them as shock absorbers but in reality, they're predominately load sharers in the knee. And they tear quite easily, there's lots of ways to tear a meniscus. So meniscal tears are one of the most common things that a knee surgeon will ever see. Now, if you develop a spontaneous degenerative meniscal tear in an older patient, in about two thirds of those settle down with conservative management just with time, doesn't mean their meniscus because it's healed or regenerated or grown back, because they don't, it just means the nerve fibres have shriveled back and it's no longer hurting. And if it's not catching and it's not mechanically unstable, you're not going to get mechanical symptoms. So in about two thirds of patients, if you're cautious, patient, you give them time and time, TLC and a bit of rehab, their knee will settle down enough, maybe not 100%, but enough for them not to need surgery. This is in older patients with a degenerative meniscal tear. If you have a younger patient with a traumatic meniscal tear, most of those will need surgery and it's much more important to operate on them sooner rather than later. Because the sooner you catch them, the more likely they are to be repairable. This is a ragged complex tear in the posterior horn of a medial meniscus. And when you look about the whole thing is in a bit of a mess and those bits of tissue are gonna catch, they're gonna flick around, that's going to be very symptomatic. If it's symptomatic, if those symptoms feel bad enough to justify the pain, the hassle, the risk of surgery, then you're going to go ahead with an arthroscopy. There's no way a ragged tear like that is repairable. So you're going to trim it, you trim away as much tissue you need to get the remaining tissue smooth and stable whilst trying to leave behind as much as you can and that's a partial meniscectomy. Partial meniscectomy has a very, very high success rate for eliminating meniscal symptoms from a meniscal tear.

Steven Bruce
What's the general life expectancy, if I can put it that way, of a partial meniscectomy. How long will it last?

Ian McDermott
You mean, how long will the knee last?

Steven Bruce
I'm sorry, what I mean is how long will it be effective for, because presumably with that loss of load bearing, or load sharing that you've now experienced is going to be more wear on the articular surface.

Ian McDermott

Again, you gotta be really careful with precise use of terminology, the partial meniscectomy will work forever, you've taken away the torn tissue. And it's not like the more you take away, the more likely what's left is to tear, the more you take away, the less there is to tear and the less load the remaining tissue is taking. So a partial meniscectomy is 100% effective at getting rid of the torn tissue. And if it's the torn tissue that's causing the symptoms, well then, it's got a very high probability of getting rid of the symptoms of the meniscal tear, it does not restore the volume or function back to the meniscus. So it's 100% ineffective at restoring meniscal function. So if you've got a meniscal tear that's asymptomatic, well, leave it alone, because you're better off keeping as much meniscal tissue as you can. If it's symptomatic, and symptomatic enough that you can't tolerate your symptoms, and you feel that you need to get something done, well then have a trim. And if you have a trim, it'll get rid of your symptoms, it won't restore the function. And therefore, the consequences are actually in the longer term, not the short term. And ping, as if by magic, so this is some pictures from one of the studies we did at Imperial College. Top picture is an intact lateral meniscus and that's the pressure profile. The bottom picture is what the lateral compartment looks like when you've taken out the lateral meniscus. So what you do is you have a much smaller contact surface area and therefore much higher peak contact pressures in that smaller area. And that's what causes the articular cartilage to fail and eventually wear away and you end up with arthritis, if you want. So that is why, if you can possibly repair a meniscus, you should. So that comes back to the younger patients. If the younger patient with a traumatic tear, especially if it's a vertical peripheral circumferential tear, you really, really want to repair that if you possibly can. If you look at the literature, the literature suggests that maybe about 15% of meniscal tears are repairable. And the success rates vary massively between the different published papers from anything from 50% to 90%. I audited my practice a few years ago now, and I repair about 1/3 of the tears that I see but that's because I see a lot of younger patients with a lot of sports injuries. And my patient satisfaction was between 96% and 81%. So 80 to 90% satisfaction. So even if you repair it, it does not mean that that tissue will necessarily heal. And if it ends up not healing or retearing, then sometimes you have to go back in and just trim it anyway. And that's a massive negative because then the patient is undergoing two operations instead of one, with a lot of pain and hassle in between. So it's very, very important that you pick and choose your meniscal repairs. Again, I can't say enough times, patient selection is everything. And if you lose a meniscus, well then you're more likely to get arthritis. If you want to quantify that risk, if you take out the whole meniscus, so a total meniscectomy, then the relative risk of you developing arthritis is 14 at 21-year follow up. So you're 14 times more likely to develop arthritis, an easy way in terms of the numbers is you say, 15 times within 20 years, just roughly. And if the patient still doesn't seem to be taking that seriously, well, then tell them the risk is 1,500%, it's another way of saying it, and then all of a sudden, yeah, you take it seriously. So that's why you don't want to tear a meniscus. If you've torn a meniscus and you're young and there's a chance of it being repairable, then you want a meniscal repair. The longer you leave a meniscal tear, the less likely it is to be repairable. However, ragged, degenerate meniscal tears in older patients that are rarely if ever repairable. And therefore, all you're going to do, if anything, is trim them, and that's purely to get rid of the symptoms, it does not restore the function. If the symptoms are not bad enough to justify the pain, the hassle and risk of surgery, you're better off leaving the meniscus as it is.

Steven Bruce
Ian, one of the things I find in all of these shows is that my wife Claire can bring everything back to something related to horses. And she's asked regarding that picture of a meniscal repair, is that blue string baler twine because she's been looking for some way of using baler twine.

Ian McDermott
No, sorry, it's a non-absorbable suture. Basically, it's similar to polyethylene.

Steven Bruce
Claire will be very disappointed.

Ian McDermott
Yeah, sorry. So then, let's take the logic one step further. What happens if you've lost your meniscus? And as a result of losing your meniscus, you're beginning to develop premature, progressive wear and tear of the articular cartilage and it's symptomatic? Well, the answer is put in a new meniscus. It's not new. That's Klaus Milachowski. He published the first paper of a case series of human meniscal transplants back in 1989. And he actually published it in 1987 in the German speaking literature, but 1989 in the English-speaking literature. That's a meniscal allograft from a donor. There's nothing better for replacing a missing meniscus, then a meniscus. It's immuno privileged tissue. So it doesn't elicit an immune response so it doesn't get rejected. All you got to do is match left knee, right knee medial or lateral in size. That's it prepared ready to go in. That's a medial compartment with no meniscus, and the articular cartilage surface is beginning to fail. And that's the meniscus allograft put in. Does it work? Well, yeah. Here's the last piece of the equation from that previous study. The left-hand pictures are 2d, the right hand picture is the same data but 3d. So the top two pictures are an intact lateral meniscus. The middle pictures are what the pressure profile looks like when you remove the meniscus. And then the bottom two pictures are what the profile looks like when you put in a meniscal allograft. So a meniscal allograft restores the contact pressures back towards normal, but not to normal. So again, a meniscal allograft is better than no meniscus, it's not as good as your own original meniscus. And also, it doesn't make any articular cartilage damage that you might have already developed. It doesn't reverse that. So the aim of meniscal transplantation is to reduce somebody's pain, maintain their function, keep their knee going for longer, to try and delay but not necessarily avoid the time when they need a knee replacement.

Steven Bruce
Can I ask what the criteria are for patient selection here, and I speak with a certain amount of self-interest having had a total meniscectomy in 1982. And then progressive arthritis probably 20 years after that. I was never offered that option. And it might not have been appropriate, but I never even heard the option raised.

Ian McDermott
There's only a small number of us who do meniscal transplantation in the UK and a very, very small number of us that do it in big numbers. And I did my first meniscal transplant in, can't remember, 15 plus years ago, something like that, quite a long time ago now. And it's one of the most fiddly, technically demanding, soft tissue knee procedures that you can do. It's not the kind of thing that you just get to do once in a blue moon, because there's a steep learning curve, it's difficult, so not many surgeons do it.

And then number two, the patient selection criteria are very, very strict. Again, there's an age limit and, broadly speaking, the cut off, most people kind of agree the cut off again is about 50. And it's not for an arthritic knee, it's for somebody who's lost their meniscus and their knee's beginning to go downhill. And it's not even to stop that downward progression, it's to slow it down, it's to buy them extra time. So again, it is salvage surgery, not restorative. And there's lots of other criteria. It's, you know, you could have a whole evening talking about meniscal transplantation, and then the success rates, again, if anybody ever asks you in an exam situation or any clinical setting, what is the success rate for x, and if the phrase involves, or includes the word cartilage, whether that's meniscal cartilage, or articular cartilage, and if the why is five year success rate? The answer is 80. All right, if you want to be a little bit more optimistic, it could be as high as 85. 80 to 85% success rate with every single procedure at five year follow up for articular cartilage and meniscal replacement.

Steven Bruce
So in the case of all the practitioners watching this evening, I mean, they will come across I'm sure plenty of patients who will have had at some stage, a complete meniscectomy. And presumably, given that nobody even mentioned this to me, we ought to be aware of those surgeons who are offering it so that at least the choice is put before them.

Ian McDermott
Just to burst the bubble and to be kind of slightly negative about it. The answer that I unfortunately have to give to the majority of the patients who ask me, can I have a meniscal transplant is no, I'm sorry, your knee's too far gone. And you're not appropriate. Unfortunately, that's a reflection of the fact that exactly as you've just said, not enough people know about it, and therefore these patients are not referred early enough when they're still a candidate. And by the time that they hear about it, their knee's knackered, and it's too late. You've missed the boat. Yeah, so that is a problem. But the good news is that only a small percentage of people who have a meniscal trim actually end up being suitable candidates or needing a meniscal transplant. There are other options. There's miniscule scaffolds, but they're all a bit rubbish. So this is a chondral meniscal implant, and they're not very good. You know, they say that about 75% of the missing tissue grows back, it doesn't. The tissue that grows back is just scar tissue, it's not proper miniscule tissue, and they've got very, very high failure rate. So I stopped using meniscal scaffold years ago. They're just not good enough. If you want to replace missing meniscal tissue, there's nothing better than actual real meniscal tissue, in other words, a meniscal allograft, a donor meniscus. So what happens if you put it all together? Now, you know, why the emphasis on the meniscus? Well, if you've got articular cartilage loss, and you've got no meniscus, there's no point in replacing the cartilage on the joint surface. And yes, you also replace the meniscus, because the meniscus protects the articular cartilage surface. Likewise, if you've got bare bone rubbing against a meniscal allograft, it's much more likely to fail. So you either don't do a biological reconstruction in that situation, or you reconstruct everything, in other words replace both. If you do that, that's what the Americans refer to as a biological knee replacement, and I think that phrase was first coined by Kevin Stone, he's a knee surgeon in San Francisco. So this is really the kind of stuff that takes years off your life as a surgeon, okay. Big defect on a medial femoral condyle. Once you stabilise that and debride it down to a clean base and a stable edge. That's your defect. That's the microfracture that's been done. That's a meniscal allograft ready to go in. That's a meniscal allograft going in, in place. And then templating, putting the graft in, putting it in place. There's the graph before we've covered it in Vivostat and there's the graft once it's been covered

in Vivostat. So if you replace a meniscus and do articular cartilage grafting at the same time, that's a biological knee replacement, or to be less American and less cheesy, I'd say a biological knee reconstruction. Now that is really, really big surgery, really fiddly, really difficult. Take me about three and a half to four hours to do that. Patients on crutches with a knee brace for six weeks, they're gonna have about six months of rehab and it's probably going to take them at least nine months before they plateau in their recovery. And if you think that the success rate for articular cartilage grafting is about 80%, success rate for meniscal transplantation is about 80 to 85%. Well, that's point eight times point eight five, a little bit of an artificial way of thinking about it. But if you do something big like that, that success rates probably in the region of about 60 to 70% of five year follow up which is not brilliant. But this is salvage surgery. This is extreme major complex difficult surgery in a salvage situation for a young person who's got no other options, because you don't want to have to resort to using metal. Now, if the knee's unstable, you cannot start putting these grafts in an unstable knee, you'll just wreck them. So, if you've torn the ACL, if you've got an ACL deficient knee, then you've got to stabilise the ACL, you've got to do an ACL reconstruction. So that's a complete ACL tear there. Stabilise it, that's an ACL graft. If you've got malalignment, you cannot do cartilage grafting or meniscal transplantation in a knee where that compartment is being overloaded due to malalignment. So that's somebody with a valgus knee, lateral damage. And that's a lateral opening wedge distal femoral realignment osteotomy. To straighten up the knee combined with a lateral meniscal transplant, we're talking massive complex surgery. That's a medial meniscal transplant, with a medial opening wedge proximal tibial realignment osteotomy to offload the medial compartment. That pin in the femur is from previous surgery, that's from where they had an ACL reconstruction in the past. So we're talking really, really big scary stuff. Now, what comes next? Well, hopefully, one day, better meniscal scaffolds, we haven't got them yet. But obviously, people are researching. Cells. One thing that I'm really, really keen to try and develop before I retire, and we're gonna get that done, ideally within the next one or two years now, is to get something called BMAC, which is bone marrow aspirate concentrate where we take a 60 mil bone marrow sample, we spin it down, we get down, we concentrate the bone marrow cells so that we can inject those cells with our grafts to increase the cell count. And that's something that I'm working on with the guys of the Weymouth Street hospital. And hopefully, we're going to be able to get that into clinical practice in the not-too-distant future.

Steven Bruce
I'm not wishing to sound dismissive. But why is it so difficult? You make it sound as though you just spin some bone marrow, and you get all the stuff you need? And that's it. It's as easy as that.

Ian McDermott
That's because I just said it very fast. It's like saying, well, yeah, my car's not working. So take it to the garage and fix it. You know? It's complicated. You know, you've got to go through the clinical governance committee, you got to go through the new procedures' process, and everything you do, there's a lot of building blocks to get it in place. There's also regulatory issues in terms of whether it's regulated by the Human Tissue Authority, or the MHRA, whether it needs a special license, it's a big deal. I just make it sound easy, because I said it fast. And then other things, you know, growth factors, you know, can we concentrate the growth factors with PRF or even potentially adding in things like PRP to try and improve healing, and eventually, in a given time, there will be tissue engineering, you say, my knee hurts, my spine. Okay, I'll go to Amazon, and I'll order a new one. And they'll grow me a new one, a few weeks later, you know, we'll stick it in. Ultimately, eventually, it's going to be nanobots, nano technology, it's

going to be gene therapy, you take a tablet and you're growing a new knee, but we are miles away from that. And I think part of the problem is when you hear a talk like this, or when you read an article in a magazine, it's going on about latest techniques. A lot of patients kind of get carried away, or maybe it's not the patient's fault, because a lot of newspapers dramatise things. And they make it sound, oh, my God, look, we've got a new cure, and it's brilliant. Well, most of these things are massively exaggerated. Okay, a lot of the reality is always lagging way behind the marketing. And then, final word of warning is, beware of the dodgy stem cell salesmen. There are individuals in central London and elsewhere who are offering people stem cell injections into their knee. What they're actually doing is periumbilical liposuction, they're taking fat cells, putting it in a syringe with ball bearings, shaking it. And if you know these people, then what I can say is that gesture is quite opposite. The ball bearings, smash up the fat, and then all you end up with, they leave it to settle and you end up with with a layer of smashed up fat cells at the top that they take that out, inject it into your knee and say it's going to grow you a new knee, they say it's going to cure 80% of knee pain. What an absolute rubbish, completely unscientific, no clinical justification, no clinical evidence for that whatsoever. These people are con artists, and by the way, it's about 8000 pounds per injection.

Steven Bruce
Ian, I'm really delighted that you told us that because I had a question ages ago from Gillian about stem cell therapy, and I was saving it up until you finish this, but I think this must be what she's referring to. I haven't seen the adverts myself. But clearly there must be patients asking about this.

Ian McDermott
All the time, and I've had loads of patients come to me and said, oh, yeah, I had stem cells injected into my knee. And I said, did it work? And they go, no, I go funny that, and how much did it cost? Oh, yeah, 8000 pounds. Well, you know, it's criminal that these people are being taken advantage of. So I can sum up these stem cell injections with one slide and it's this. We have an absolute moral and professional obligation to protect our patients from quacks. Right? Yeah, I'm angry, I'm furious. I think these people are scum. I think it's the dodgy doctors that ruin the medical profession. And nobody hates a dodgy doctor better than an honest doctor.

Steven Bruce
I think that's probably the case in our professions as well. Because even, you know, as I say, the risks are lower in what we do. But nonetheless, there are people out there trying to fleece our patients. And it's disappointing to hear that doctors are getting away with this because I mean, it is very much an invasive procedure. And I'm surprised they're not finding themselves in front of the GMC.

Ian McDermott
Couldn't agree with you more. Don't start me off about the GMC police.

Steven Bruce
On a different note, then, Sarah sent in a question out of curiosity rather than anything else. She wants to know whether you enjoy what you do, because it sounds like it. But just there you were sounding quite cross.

Ian McDermott
Do I enjoy what I do? Well, that's a very difficult question to answer. I should say, yeah, I love it. I do love it. But the reason it's complicated is, it's who and what I am, it's like asking a hedgehog, do you like being spiky? You know, it's like asking a giraffe, do you like having a long neck, it's like, I'm a giraffe. It's all I do, it's what I've done for years and years and years. I'm passionate about it. The reason I'm so into it is because I want to do the best job I possibly can for every single patient every single time. So if you're not constantly pushing yourself, well, if you're not the best that you can be, well then you're doing your patients a massive disservice. So yeah, I've got one of the best jobs in the world, I think I'm incredibly lucky, I've got a fantastic job, and I wouldn't do anything else. So I love my job. It's difficult, it's stressful, it's challenging. And every single operation is stressful, because you're constantly trying to do the best you can, whilst at the same time, you're constantly being confounded by nature and luck. If something bad can happen, well, then eventually it will, it's just a matter of odds. And the same applies to surgery. If something can go wrong, if a complication can happen, well if you do enough operations, it will go wrong. And then if you do get a complication that's devastating for the patient and devastating for the surgeon as well. Because, you know, we're here to try and fix things and make things better. So it's hugely, hugely challenging, but, you know, I'll answer by, I wouldn't want to do anything else in life.

Steven Bruce
I'm very pleased to hear that actually. Because, yeah, I mean, you've obviously got an awful lot to offer. And it would be horrible to think that it was a miserable day at work when you were doing three or four of these operations.

Ian McDermott
I say to people, I do knees and they said, what, just knees, and I'm like, do you know how hard it is? So my answer back is no, no, no, just knees. I do left knees and right knees. And every single knee is different. And every knee is in a patient and every single patient is different. You know, it's just like saying, okay, you're an osteopath. So aren't you bored of backs. No, the more you get into the subject, the more you get into it. It's a positive feedback loop.

Steven Bruce
I think patients should be just delighted that you only do knees, if I can use the word only there, because actually probably makes you pretty damn good at news. Somebody else Kari asked earlier on whether the bulk of your patient population is sports people.

Ian McDermott
50/50. So, roughly 50% is younger people with sports injuries. The other 50% is older people who are either developing or have arthritis.

Steven Bruce
Okay, so I've got a few questions here. And we are coming to the end of the show, but I'll try and run through these if I can. Coxy here. Why did the Royal College of Surgeons award the Hunterian award for stem cell work in 2017, after what you've just said?

Ian McDermott
Because stem cell research is incredibly important and proper stem cell research is amazing. And it's going to be a part of, you know, everyday medicine in the future, what I'm talking about, what I've just talked about are the dodgy stem cell salesmen, who are basically the conmen who are just injecting fat cells into these knees. Stem cell technology is where you isolate and then culture stem cells in a lab. It's incredibly complicated, incredibly involved, time consuming, and costly. I'm not talking about proper stem cells. That's not what these dodgy docs are doing.

Steven Bruce
How would the average patient or dare I ask our practitioners know the difference?

Ian McDermott
By reading, and asking questions, and also relying on advice from people who you can trust, which is why we set up the UK Biological Knee Society, which is this slide, a few years ago to promote good practice, and to try and highlight and wheedle out bad practice.

Steven Bruce
Okay, a useful resource, and I'm sure there'll be lots of people are following up on that. A few other questions. I've just been told that you were trying to talk a minute ago, and to ask if you could cover something else, and Claire is saying what that was you were trying to cover. Sorry, I can't hear you at the moment because I've had to mute you so that I can talk.

Ian McDermott
Okay, I bet you anything, my wife would kill for that button. She'd love it. Right? This is just the last two slides, and then I'm done, right, and we're just within time, so if you can't go biological, go metal. If you've got a small focal defect in an older patient, then we have got small, custom-made focal resurfacing implants. That's what's called an episealer from a company called episurf. And it's much nicer to have a small bit of metal in your knee on the left than a big, massive load of metal in your knee on the right. If you can get that's a total, if you can get away with a partial replacement, they're smaller, they tend to be better functional outcome with better patient satisfaction rates, but a slightly higher revision rate. That's a patella femoral, custom-made patella femoral partial. And then if you want the best possible outcome with the lowest risk of an unhappy patient, then go custom made. So I've been doing custom made knees since 2012. And they've got the highest patient satisfaction rate of any prosthesis. And then if you want a surgeon who can only either do the basics, or like a knee arthroscopy and washout, which is pointless, or a knee replacement, well, we call them a binary knee surgeon and you do not want to refer to a binary knee surgeon. If you've got somebody who can offer the full range of options, meniscal repair, replacement, cartilage grafting, focal resurfacing, realignment, osteotomy, partial and total knee replacements, we call that a portfolio knee surgeon. So get to know your local surgeons, get to know whether they're any good and where they are on that spectrum from a binary knee surgeon to a portfolio knee surgeon and be careful who you refer to. Done.

Steven Bruce
Ian, thank you very much. I suspect if you stop sharing your screen, it might fix my audio problems. I'm not entirely sure. But we'll see. No didn't, hasn't stopped my audio problems at all. Anyway, let me ask a

couple of a few questions that are on my list here. Particularly, Miory has asked, how long after a graft is done can we start doing rehab with our patients?

Ian McDermott
Depends what graft, how big, what surface. Every single patient's rehab is tailored to what they've had done. So generally speaking, as a broad, broad guide, I would put a patient on crutches, minimal toe touch partial weight bearing with a knee brace for six weeks, and at the end of that six-week period, then slowly and cautiously ramp things up with their rehab, protect it for say six weeks and then gradually get going.

Steven Bruce
Okay, thank you. Carry's asked, what's the recovery like for the posterior patellar graft in terms of soft tissue and function?

Ian McDermott
Didn't understand the question? Can you say that again?

Steven Bruce
The question is what's the recovery like for the posterior patella graft that you showed us in terms of soft tissue and function? I think you talked about soft tissue earlier on, but in terms of knee function, how is that affected?

Ian McDermott
Okay, for that patellar graft, that patient would have been kept in a knee brace, locked in full extension for the first two weeks and minimal toe touch partial weight bearing and minimal toe touch partial weight bearing is better. It puts less load through the knee than non-weight bearing because you don't have to lift your leg up the whole time. And it's safer and easier. So locked in full extension for the first two weeks and then from after the first two weeks up until six weeks still minimal touch partial weight bearing, but gradually adjusting the locking mechanism and getting the patient to gradually bend their knee more and more but with unloaded range of motion exercises, and then at the six week post op mark, then start the grab the patient, gradually increasing their weight bearing, gradually building backup towards full weight bearing and gradually weaning themselves off the crutches as comfort and competence allow, at the same time getting the rest of their range of motion back. So that's going to take easily six weeks before then you get to the three-month postop mark. And most people by then might then feel ready to do a little bit of gentle exercise with the seat up higher, the resistance download, avoiding standing up on the pedals. But the overall rehab is going to take six to nine months. It's a big deal. It's a really, really big deal.

Steven Bruce
And it seems to me, speaking again from my own personal experience, as well as from looking at patients, and after a lot of these things, it's very, very difficult to regain anything like full flexion in the knee. What would you expect for that operation? What would you expect from a graft or from let's say, a knee replacement?

Ian McDermott
God, that was lots of different questions rolled into one sentence there, that patient with the patellar, I'd expect them to get pretty much full flexion because the rest of the knee was fine. The main reason that people start to develop a lack of flexion or a fixed flexion deformity, or restricted flexion is simply because the whole knee is beginning to become arthritic. So you start getting osteophytes, the capsule thickens, the muscles stiffen up, everything. So once you start losing your range of motion, that's a clear, clear indicator that you are beginning to go down that path of degeneration, heading towards arthritis. You've kind of, your postop range of motion after knee replacement depends on how stiff your knee was pre and depends on how old you are and how much you commit to the rehab. But if you've got a good knee replacement, then I'd like to see my patients normally flexing 235 degrees. Occasionally more.

Steven Bruce
Ian, thank you very much. When we started this, I said we stopped sharp at nine o'clock, so that you can get away and get down the pub or whatever it is you do before a full morning surgery the next day. We're a little bit late today. But I just want to thank you so much again for your time. Long ago, I had a message coming in and saying that we had lots and lots of people saying just how amazing your approach is and how much they admire the amount that you're sharing this information. And we've had just under 500 people watching this evening, so a lot of people are really grateful.

Ian McDermott
Cool. It's not rocket science. There's nothing that I've just said, there's anything other than pretty bloody obvious if you know your stuff. It's really not rocket science. So anyway, I love talking about knees, I'm always happy to share.

Steven Bruce
Thank you. And we're very grateful. And of course, it's not rocket science when you've been a consultant for 25 years. So it probably comes a lot easier then. That is it for this evening. Thank you for bearing with us. And I apologise for the slight problem with my sound here. Hopefully we managed to cope with that fairly well. Looking ahead, we've got a few things coming up. We've got a case-based discussion next week on Wednesday. If you've got a case you want to share, then please let us know because it's great to have people bring in cases in, we have got some, I've got another therapist and other osteopath coming to join me in the studio to talk about a particular case. But we probably have time for other cases during that show. That's next Wednesday lunchtime. On the 27th of this month. I have Gillian Vanhegan joining me in the studio to talk about psychosexual therapy, she promises me a practical component, which is slightly scary. And I think it's gonna be a very interesting programme because of course, it's an element of communication with patients, which perhaps we don't often consider. And then I know we had a lunchtime show at the end of the month on the 29th, where we were going to be talking about colours, which sounds a bit off the wall. But we're thinking, on a business and marketing note, how you use colours to put across your message in the best possible manner to your patients. So there's lots to look forward to. Ian had a whole load of slides today in his show. I'll be sharing those with you tomorrow. But that's it for tonight. Hope you've enjoyed the show. Hope you've got lots of information out of it. Thank you to my team for keeping the show going despite the audio problems and thanks of course to Ian for sharing all that information. That is it. We'll see you again soon. Good night.