

[MUSIC PLAYING]

MACALUS V. Some of you, I've met. Some of you, I've not. And thank you all for being here in Pittsburgh.

HOGAN:

And so for those of you who I do know well, and who know my wife-- my wife is a radiologist. And so when I talk to her, every time I go to a meeting now, it seems as though the imaging world continues to advance itself into the world of we buffoons of surgery. And so she tells me, stick to what you know, and don't try to extrapolate what you don't know.

So the beauty of that is, the talks I heard here today already, and looking at the list that [INAUDIBLE] had, you guys have a number of individuals who are skilled in the imaging piece. So I'm going to talk a little bit going into-- as [INAUDIBLE] mentioned-- some of the innovative possibilities for ultrasound-guided surgery. But also, have a little fun on a Friday afternoon of a little hype versus reality of some of the procedures that I believe ultrasound-guided therapies and surgical procedures could change and evolve for us. So the typical disclosures, nothing here.

So the way I look at this, and the way we look at it from a orthopedic surgical, foot-and-ankle surgical standpoint, and some of this has been summarized quite well already. If you think about the current state of ultrasound, diagnostics, guided injection, aspiration therapy, dynamic assessment. And I remember several years ago, it was almost-- I've been here five years now. I remember, if I ordered a dynamic ultrasound, I did not put six different people from UPMC who I knew personally on how to get that study done, it became a nightmare to even have it done, executed, and read. Now, it's a natural progression of what we do.

And hydrodissection are a few things, but particularly around the foot and ankle, we think about. And obviously, diagnostics being very heavily leaning toward the ligament and tendon assessment around the foot and ankle, but I think bone will soon follow, as well as cartilage assessment.

The evolving and, really, future state is healing assessment. Can we change how we look at the healing of soft tissues, ligaments, bones, short of MRI, CT, and other advanced imaging that, right now, in health care, are more costly and are not always available.

Soft tissue autograft. Harvest techniques. Can we utilize ultrasound to minimize donor site morbidity that we have in surgery often? And then the ultimate ultrasound-assisted surgical intervention, some of which Dr. Onishi spoke to a moment ago.

But a little bit about what I do. I'm a sports foot and ankle surgeon. I do everything foot and ankle. Reconstructive, old, young, new. The best and brightest in the future.

However, 60% of my practice is probably athletics from my role at Pitt. So 16 million patients a year, football and basketball. You still have the weekend warriors, or those of us who dream that we were in the league.

And I love, actually, just watching games and taking videos. This was me taking a video from my TV at home. So this was Ben two years ago when his foot was landed on.

This guy here, guy named Anton [INAUDIBLE]-- I'm from Alabama, the state that knows nothing but football, and food, and religion. This gentleman likely would have been a lottery draft pick. Career was ended. He never played again because of this fracture-dislocation. A little bit different.

And this, the sad face. I was a fellow when Santonio Holmes had this injury. And 20 of us who were foot and ankle surgeons across the country knew he had a Lisfranc injury, probably would not come back, just from watching it on tape.

So I enjoy this type of thing during this time of year, and just thing, OK, will they be back or will they not be back? And so, with that in mind, though, there's a considerable opportunity in this realm of ultrasound.

Now, when I think about the procedures and the diagnoses that we use ultrasound the most, my most common one, plantar fascia that was discussed previously. Most common problem, posteromedial heel pain. There is not a single doctor on the planet who enjoys seeing heel pain on their schedule. Not one. I know no one. And if you do, let me know, because I will send them all of my patients.

And posteromedial heel pain, I hate it when it starts happening to me. I'm like, man, I've got to switch my shoes, got to change what I'm doing.

But inflamed fascia origin, the medial tubercle is the most common site of injury or discomfort. Worse in the morning, first steps after sitting. But it's really the initial morning, startup pain, and then after the tendon bone complex has fatigued over the course of the day, and the inflammation associated with the micro tears of the plantar fascia have now generated an inflammatory response that becomes more and more complicated and more and more painful over the course of the day. It's a problem pathologically at the Sharpey's fibers with the tight Achilles complex.

But now-- and as Onishi mentioned-- with Tenex, it's a bit of a game changer. In the past, years ago, we would do full extensive plantar fascia excisions. That didn't go well. Like most things in surgery, if it didn't go well, you probably became famous for it. And by the time people knew it was a problem, you were already out of the business.

Now, we would do open incisions at the heel and release this. We still know that it only helps 70% to 80% of people. So now, my main approach is endoscopic release, which is a small incision. Outcomes are 85% to 90%, but not guaranteed.

And the other problem in the developed world is that no one wants to wait the 9 to 16 months that this will resolve if you just stretch, and wait, and stop running, or stop doing what you're doing, or stop wearing the shoes that you really want to wear. And this was not a problem when we all walked on clay. It's a developed world problem.

So now with procedures such as Tenex, as described, we have the opportunity and ability to address the entire plantar fascia from its origin, even potentially into the mid foot safely, while possibly being able to provide relief in a minimally-invasive manner. So there's opportunity there.

And then, if they're lucky, they get the not-so-big deal, but it's essentially surgery. If you rupture, that's the best thing ever. I say, my job is done. Because you have essentially relieved the tension that is there. So the ability to use an ultrasound-guided approach to provide that is actually something to consider. And so, can you create a controlled, minimally-invasive rupture in an individual? It's something to think about.

And when you think about it heavily, this is the year-- this is Peyton's last season. This is the only position he needed to stand in. When you remember his last season, when they won the championship, he was out several games. The big debate. Who's going to start? Of course he was going to start, because he knew he was over.

That particularly year, Drew Brees missed about four or five games because of his plantar fascia. If you go back and watch the last of the championship game, he was out of shotgun pretty much majority of the game so he wouldn't have to backpedal with his plantar fasciitis. That's why the NFL and every sport protects their injury report. If you know this guy can't go from under center, you have to change your entire game plan. So Peyton had a considerable problem with this.

But if we are able, again, to provide a controlled release of the plantar fascia in a safe manner, then all of a sudden, someone with acute plantar fasciitis, who's to say we shouldn't just automatically go in with a needle, rupture a component of it versus injecting it, and then hope for the best. That is a big debate happening right now in the elite sports world.

Turf toe. This is one that was discovered right down the street in West Virginia. Again, a problem with the services we run and play on. But I think there's a unique opportunity here, and the anatomy affords that. Very much a problem in the NFL. Turf toe has a tendency to end careers in a number of sports, and problematic.

But if you look at the complex soft tissue anatomy around the first MTP joint, this is an environment where any open incisions are quite problematic because the amount of bleeding and scarring that it generates. So our ability to potentially address this in an endoscopic or minimally-invasive fashion, such as ultrasound-assisted, is possible, particularly the ability for very well-defined, high-definition ultrasound to identify the soft tissues that are at risk with any type of procedure.

This was the beginning of the end for Rose. He had a turf toe problem before his knee was a problem. And he really had problems because the turf toe on a guard, or a skill player, changes their game completely. Their ability to explode, their ability to cut, in just fear of the pain they're going to have, if you are a skill player-- again, or a guard-- problem.

But hyperextension, the forefoot is fixed. The heel is elevated, and another player provides force to that area. And this is really problematic, again, on hard courts or turf.

But if you think about the injury, the duration of symptoms of the problem, we usually observe this. Palpation, the collateral ligament's dorsal capsule, the plantar sesamoids are key. And then you put them through a considerable number of stress tests to see how stable the joint is.

And again, a dynamic exam is more helpful, and where ultrasound may have an opportunity, than the MRI. With the MRI know that I'm about to have a problem? But a dynamic exam gives me this.

So if I weight-bear them, and then I hyperextend their MTP joint, I can appreciate how much displacement they may have with the sesamoids. This is considerably very timely. You're kind of guessing, where am I? Where are the soft tissues? Then we always end up getting an MRI.

You hope not to see this, but this makes it easy. You say, you know what? You're going to be out for a while. But when they have a grade 2 injury-- not a grade 3 such as this-- what do you do with that? And if they have a grade 3, the surgical procedure for this usually takes people out anywhere from 8 to 12 weeks minimum before they can push back because of the dissection we have to do around the MTP joint.

We treat them conservatively. We put them in a firm shoe. Again, carbon fiber. Hope they can recover.

But this is a good case. Acute diagnosis of a sprain. Unable to return to play. The MRI showed a 50% partial tear. I tell my wife, this is the bane of my existence. Just tell me it's completely torn or not, particularly because they can see the report. All right?

So this tells me nothing, other than I know it's pretty bad. Then stress X-rays do show a side-to-side difference that is helpful. Initial treatment, this person was treated in a boot. No improvement.

So now, we decide about surgery. A dynamic exam early on probably could have aided me in determining, particularly if I'm seeing how those soft tissues are gliding, should I just operate on this person now versus waiting? But in this particular case, you can see there's proximal retraction of the sesamoids compared to the contralateral side.

And then, I took this person to the operating room and placed these anchors. I had to essentially peel off the entire plantar aspect of their MTP joint and their sesamoids, grab that tissue and bring it back up with anchors. A minimally-invasive approach, or a guided approach for the anchors that could possibly be driven by ultrasound, would have made this a much quicker recovery, and also less soft tissue swelling and injury. He did return the next year.

But the hype of all this. This ended these guys' careers. Shaq's biggest problem. He had a horrible Achilles, which everyone knew. But when you're 350, that's what happens. But when he had his turf toe injury, he really struggled to get back from that. He was a post player.

Deion Sanders has two of the worst big toes in the history of the NFL. And if you watch the NFL Network, he still jokes about it. So this is a big issue. So unless you're Primetime skillset-- he was still faster than most of the people in the league with his turf toe. Others? Not so lucky.

Syndesmotoc injuries. This is an environment where I think there's considerable opportunity due to the complex ligamented structures around the ankle, and some of this was alluded to earlier. And so if we look at the anatomy, we are essentially driving all of our decisions off of the syndesmotoc ligaments and our understanding of what's happening laterally with the syndesmotoc complex versus what is happening with the deltoid ligament. And disruption of the ankle ligaments is really-- which we still don't know who will be deactivated from a standpoint of their ability to propel themselves forward based on grade of injury of their ligament. So again, a very complex injury to deal with.

And then the deltoid ligament, one of the most complex ligaments in the body with a deep and superficial component, seven attachments and origins. This is a very complex environment to manage, but also assess healing after injury. So there's opportunity there in ultrasound.

So this essentially happens to the very extreme external rotation stress with application of stress to the knee. And when someone has this injury-- and this is the issue. Often, we will not see heterotopic ossification until almost a year later.

And so if you can't advise someone about their injury at the time of injury, short of an MRI, it can be pretty complex. It can be pretty much a dynamic discussion that you're having with them when they come back and they say, whoa, why do I have all this heterotopic bone now in my interosseous membrane? So the ability to diagnose these injuries is key.

Now, we know what the bone should look like from a standpoint of normal alignment. We have no idea what the ligament should look like over the course of their injury pattern and healing capacity. MRI gives us spot checks. Obviously, we cannot do MRIs on the lay community every week, like we sometimes do in our professional athletes. So again, this is an opportunity for ultrasound to really take hold.

Now, this is a soft tissue injury. It was significant instability consistent with-- you have decreased overlap of the tibia and the fibula. You have a huge medial clear space widening, and the ankle joint is tilted. So this is an unstable ankle.

But I'll give you the debate. 22-year-old lineman comes in. This is not his X-ray.

That one's easy. You know that person needs surgery. I'm very sensitive to syndesmotic injuries because I had an ankle that looked just like that Alabama kid's ankle when I was a senior in high school. Ankle fracture-dislocation. Clearly out. Had to have surgery.

Mine was easy. When your foot's looking in the other direction, you know you need something fixed. But when they walk in holding their breath, hoping that they don't need surgery, you have no idea. And so you have to take your skill set, and your experience, and drive forward.

22-year-old lineman. Status post-injury, opening game. These are his images.

So you get-- all these images here look OK. Non-weight-bearing. Weight-bearing's my favorite. Non-weight-bearing, but I won't be enemy of effort here from the ER.

Then this is the stress view. Why is the stress free so hard to show, is this normal? You do the other side. You don't know.

It looks abnormal, because he has a little bit of pain. But this is what happens when you have a 300-pound lineman. You need another 300-pound lineman to do an adequate stress view on them.

[CHUCKLING]

All right? So the problem you have is that, now, we're like, OK, we think we're going to get an MRI. We know we're going to get an MRI. But what if, in the office, I can have some assessment?

Now, we stress-- bring him back a week later. Do the same thing. Then he stands on it.

You'll be very surprised if I told you when I actually weight-bear X-rayed his other side, it looked just like this. No symptoms. So now I still have a problem. I have a 300-pound lineman who doesn't want to have surgery who I'm telling him, you are dynamically unstable.

So now, we get his MRI. Shows all the things that I anticipated, but not horribly. This is the bear in the room.

An ultrasound initially in the office would've shown me that. I could have shown your deep deltoid is torn. You have significant pain as well as his AITFL is completely out, and the interosseous membrane. Would have saved me three to four weeks minus the MRI, also save some money and pay back some med school loans. All right? So we have to become more efficient and use the technology that we have available to do that.

Now, ongoing fixation debate as well. Do we have to provide these very rigid fixation? The ability to dynamically assess in the operating room, in regards to some of the discussions I heard earlier as far as the length and the elongation and shortening of the ligaments before and after fixation, may give us an opportunity to provide some more flexible fixation, but also know that we're going to give them enough stability to heal. So there's opportunity there.

So the next frontier-- and I'm not going to steal the thunder of one of our visitors from Japan. But ultrasound-guided lateral ligament stabilization. Dr. [INAUDIBLE]'s work that he'll be speaking to you guys about further. I think this is where there's this considerable opportunity for us, particularly here in the States, to evolve forward with this technology. And I'm looking forward to learning more from him, and hopefully, we can convince him to come spend more time with us here.

And so as I close, the reason that I think we have a lot of opportunity here is because we're one of the few sites in the country that essentially all this technology is available to us. These are the different labs that we have through our foot and ankle injury research group, collaborating with our orthopedic robotics lab, biodynamics lab, as well as with our neuromuscular lab to assess joint motion throughout the body. And so it gives us the opportunity to assess these new innovative techniques, and I look forward to learning more from you all. And thanks for your time. My wife, [INAUDIBLE] and--

[APPLAUSE]

She looks much smarter than me, as well as my daughters. And so thanks again. Thanks, [INAUDIBLE]. And I'm happy to answer questions.