Transcript Role of Denervation for Hypertension Management

Dr. Paul Friedman: Hello, my name is Paul Friedman. I'm the chair of cardiovascular medicine at Mayo Clinic in Rochester, Minnesota. And today I'm delighted to be joined by my colleague Dr. Sanjay Misra, who's a professor of radiology and expert in vascular biology as well as renal denervation. Sanjay, thanks so much for joining me.

Dr. Sanjay Misra: Thanks Paul, for having me.

Dr. Paul Friedman: We've heard a lot about renal denervation and its role for blood pressure. What exactly is it and how does it work to lower blood pressure?

Dr. Sanjay Misra: Yeah, so the- before any hypertensive medicines, the treatment for hypertension was sympathectomy done surgically. And this data expands on how to do this with a catheter. And as you know in cardiology, we have abilities to cannulate renal arteries where the sympathetic system originates or is found on the advent tissue on the outside. And by taking catheters that have energy, either RF, ultrasound or chemically based, we can kill the nerves and create a local sympathectomy done to both arteries and reduced blood pressure. This technology's been around since the mid two thousands and now we have two FDA approved devices that we can use.

Dr. Paul Friedman: Got it. So what patients would benefit the most from this type of treatment?

Dr. Sanjay Misra: Yeah, so many randomized trials were done and currently we are treating patients who do not meet their blood pressure goals, either defined by American Heart Association or American Society of Hypertension, typically one 30 over 90 on maximal antihypertensive therapy, including it's as many of our colleagues know, an ACE or an ARB, a beta blocker, or a calcium blocker and a diuretic. So maximal medical therapy unable to reach their blood pressure goals.

Dr. Paul Friedman: The initial enthusiasm a number of years ago for this therapy was very high, and then it seemed to sort of fall flat for a while. And now we're seeing some additional emerging data and growth and interest in this strategy fill us in on the clinical evidence supporting the therapy and how we could best select patients for it.

Dr. Sanjay Misra: Yeah, excellent question. The initial therapy showed wonderful results in a small group of patients. This was the original Medtronic technology using a unipolar catheter. Some of the exuberance went down when the pivotal randomized studies did not meet their primary endpoint for blood pressure change. So that technology has went through an evolution and other technologies have come which are better suited for the renal artery. The renal artery has its own challenges, the size, the length, and the ability to place a device that opposes the vessel wall to deliver energy. So those are some of the technological changes that have happened. The FDA met in a panel discussion about a year ago, looking at all the data and approved two technologies initially, the Medtronic technology, which is RF based, and then a ultrasound based, which is the Recor technology. And these technologies are being used currently for patients who are resistant to hypertension. And we can talk a little bit about the workup, but these are patients that are not meeting their goals and they're seen in a clinic evaluation. They undergo other causes for hypertension, including renal artery stenosis and fibromuscular dysplasia. Usually in Rochester, I prefer to have a ultrasound for the velocities and then a CTA to understand their anatomy for the audience. One third of the patients will have more than one renal artery and accessory renal arteries. We are looking for treating patients currently that have main renal arteries, three to eight millimeter diameter, and no other etiology for hypertension. The most common being obviously atherosclerotic renal artery stenosis if we're gonna do a stent or fibromuscular dysplasia, the appropriate age work.

Paul Friedman: Got it. Any, so first of all, very interesting. So it sounds like the majority, but not all patients would meet anatomic criteria for eligibility this approach. Any other workup that you wanted to comment blood test standard evaluation before you would consider going down this path?

Dr. Sanjay Misra: So I'd be remiss not to say that we are, obviously, everybody should undergo a six hour, 24 hour blood pressure evaluation. We work in Rochester with mostly hypertension colleagues or the cardiologists who are experts at this, coupled with a serum, BUN and creatinine. Some people want to see the GFR, that's the glomerular filtration rate over 45 mls per minute. So valuation of BUN and creatinine are critical. Those are the big things that we look for. Obviously a consultation to make sure that their anatomy, these are done by femoral artery puncture. So on a physical exam, making sure that there's no stigma of atherosclerotic disease. Currently there are no cutoffs for age. The patients who do the best have the highest hypertension on medical therapy. So if you are profoundly hypertensive, saw a patient the other day was systolics in the two hundreds, she's 72 years old, intolerant of of her antihypertensive medicines, appropriate anatomy, she would be a very good candidate because she will likely get the most response after treatment.

Dr. Paul Friedman: What kind of response might patients expect and how many, what would we tell 'em the probabilities of needing to continue to take anti-hypertensive medications after the procedure?

Dr. Sanjay Misra: Yeah, ex excellent question. So part of the consultation centers around exactly what you're asking in, in aggregate. It's, as many people know, including yourself, when we look at data, we pull everybody together in the aggregate, we're looking for a 10 millimeter reduction in blood pressure, you'll likely have a reduction in the amount of medicines. We don't think that we can take people off medicines, any hypertensives. That's not what we would counsel them. And then finally, we still don't know why there are non-responders. About a third of the patients are going to be non-responders. There are a lot of theories out there, and we can talk about that of why patients don't respond, whether that's incomplete treatment, whether there is a improvement in a response. If you go into the biver, the main artery into the branch arteries variability in the, the celiac and - ganglionic plexus that go to renal arteries. So there's a lot of theories out there why people don't respond as well as others. So non-responders versus responders, for example,

Dr. Paul Friedman: Are there complications with the procedure and if so, what are they and how common are they?

Dr. Sanjay Misra: Yeah, so with any procedure, anytime somebody does something invasive, absolutely a complication can occur. The biggest complications are gonna be groin, groin, site hematomas. These are currently done with the femoral approach. I, they're working on a radial. I think both, both companies are working on a radial technology. So it's a femoral approach. When you deliver energy to the renal artery, it does spasm. This happens in young patients. There will be an energy, it'll spasm. So the patients are anticoagulated ACT is typically over 250. And then the other things that can happen is you can obviously damage the arteries. Interestingly, the young patient's, normal arteries behave differently than older patient with atherosclerotic arteries. So there is a chance of of, of causing a dissection or damaging the artery and that's low, but it can happen. And absolutely the, the procedure list needs to be hypervigilant when he or she's doing the procedure.

Dr. Paul Friedman: What advice do you give to say the referring internist, cardiologist, family practitioner in terms of they sent someone for the procedure, blood pressure seems to be responding nicely. What are some of the follow-up things to look for, both in terms of complication and in terms of medical management adjusting antihypertensive and whatnot?

Dr. Sanjay Misra: There's a couple other intraprocedural things I just wanna center on. Some patients get Brady bradycardia might need atropine. This is all handled in the cath lab obviously. And then there's some pain that's deli- that happens after the treatment. So what we've noticed is adult pain in, in the location of the, the kidneys, almost like a kidney stone. So that's the early response. And that's with a good, you know, often with a good ablation or good treatment, excuse me. And then follow up, we, we measure the blood pressure twice a day and have, we work with our internists who are, are referring to measure the blood pressure and make sure that they don't become profoundly hypotensive or have some kind of rebound hypertension, place them on a baby aspirin and then see 'em back in the office at a month to assess the ultrasound, ultrasound, the renal arteries to make sure there's no damage or some late complication that wasn't appreciated in the lac. And then the follow-up is really blood pressure and then a yearly follow-up to assess for renal artery stenosis. Potentially. There were early reports that there were stenosis caused by the devices. Again, these were case reports. So I, I think the chances are low, but I think it's worth looking at the, you know, making sure we're seeing the patient's back assessing for potential stenosis, et cetera. So BUN creatinine blood pressure regularly with the internists at their discretion to assess for blood pressure changes. And then back in, in our lab with a duplex ultrasound yearly until we get some better long-term follow-up in our own hands.

Dr. Paul Friedman: Got it. So it really is remarkable to see this long journey of the development of these approaches. And it's a powerful tool in our armamentarium now for those patients who we can't control blood pressure. Well in, as you look to the future kind of and concluding, where do you see this going and do you see, you know, new approaches and strategies that will be emerging in the near term?

Dr. Sanjay Misra: You know, so I, I think there's two or three areas that we need to really focus on. One, are there advanced imaging technologies that can be used in the cath lab to identify the nerves and to on the table confirm that we've ablated the entire nerve plexus and these may be MRI based or or other advanced imaging that can really see around the adventitia to see what the changes are. So that would help guide treatment and make sure and ensure that we've got a complete treatment of the, of the nerves that the renal arteries. The other, the other areas that are being explored are other agents that can be used. Early on we did experimental work with liquid drugs, like on dieting that were administered into the peri adventitia. There is an alcohol based technology. These are, they have pros and cons. Sometimes it's difficult to control where they go, but they can be obviously very caustic and cause sympathetic denervation at a, at a higher amount than we can with energy. So those are the areas. The other areas that are more provocative are, as we learned about this, is there implications on diabetes. There were reports early on in the late two thousands that diabetic control was better. There were some reports around heart failure and other cardiac abnormalities that can occur in these patients. So there's other areas that may get investigated as we bring these technologies in. And the last point I'll make is, as you're thinking about your patient do an individualized assessment, some patients have global cardiovascular disease, have diabetes, their risk for all cause mortality because of hypertension is different than a, than a younger patient where it's only hypertension, that's a longer risk as as they get older. So we really need to contextualize this with the patient, what's his or her risk, what exactly is the benefit of good any control? And really looking at not only in the next month or so, but you know, broadly, you know, are we gonna make a big difference for this patient as he or she gets older? And that sometimes we lose sight of that when we look at randomized trials, we get stuck in a, in a box that gets enrolled. We don't really individualize the medicine.

Dr. Paul Friedman: It's so true. Trials may last a few years, but we hope our patients will live decades often. So it is critical. And obviously hypertension is such an important contributor to atherosclerosis, coronary artery disease, myocardial infarction, heart failure and stroke. So we, it really can be very impactful. It's an exciting space. You know, it's striking how we're moving from focusing only on end organs to control systems, the autonomic nerves that really control our body and hopefully with that will be even more effective in the therapies we deliver. I know it's a space you've contributed too much for over a decade. So really a pleasure learning from you today. Dr. Misra, thank you for joining me and appreciate the conversation.

Dr. Sanjay Misra: Thank you. Have a good day. You too.