

Transcript: EP 59 ECG Making Waves

Announcer: Welcome to Mayo Clinic's ECG segment Making Waves Continuing Medical education podcast. Join us for a lively discussion on the latest and greatest in the field of Electrocardiography. We'll discuss some of the exciting and innovative work happening at Mayo Clinic and beyond with the most brilliant minds in the space, and provide valuable insights that can be directly applied to your practice.

Dr. Anthony Kashou: Clinic's ECG segment making waves. In this episode, we dive into the promising treatment strategy of cardio neural ablation for atrial fibrillation. If you haven't listened Welcome to Mayo to our vasovagal one, it was really exciting and you'll learn all about that. Now, joining us back today is a cardiac electrophysiologist. He's been uh with us in the past, and he has a unique experience in working with these patients. Today we're gonna discover how vagal tone, high vagal tone contributes to atrial fibrillation, how to identify the subset patients that might benefit from cardio neuroablation and explore what the future of atrial fib ablation has in store. And so let's introduce our guest that you guys know well. Dr. Guru Kowlgi, an assistant professor of medicine at the Mayo Clinic, Rochester, Minnesota campus. He completed his medical education at Maulana Azad Medical College in Delhi, university in India, and then he came here to the United States and we're so glad we've kept him here. He finished his internal medicine training at the University of Connecticut Cardiology Fellowship at Virginia Commonwealth University, and then came here to Mayo Clinic in Rochester to complete his cardiac electrophysiology fellowship and then recruited to stay here on staff where he was a Mayo Clinic scholar. He also recently completed a Master's of science program in artificial intelligence in healthcare. Dr. Kowlgi has authored well over 80 peer reviewed manuscripts. He has research interests spanning from cardio neural ablation, which we'll talk about today to the cardiac applications of artificial intelligence. He actively participates in the medical community serving on committees and editorial boards, and he is earned several awards for his clinical and academic achievements. You can also find him actively engaging on social media where he has his handle @theRhythmDoc, so make sure you go and follow him. Thank you, Dr. Kowlgi for joining us again.

Dr. Guru Kowlgi: Thank you so much, Dr. Kashou love being here.

Dr. Anthony Kashou: Well, welcome back. You know, we talked about vasovagal syncope and how it related to cardio neuroablation, but this field is growing and you know, let's start off by looking at, you know, first atrial fibrillation, but really how does high vagal tone actually contribute to it?

Dr. Guru Kowlgi: Yes, thank you. That's a very important question. And you know, when people think of atrial fibrillation, what comes to mind is a patient who has a regular heart rate with a heart rate being very fast. So oftentimes it's, you know, over a hundred beats a minute, 120, 140, 150, and

because it's more tachycardia symptoms, for the most part, most of us feel that the arm of the autonomic nervous system that causes it is the sympathetic nervous system. So as, as we know, we have the sympathetic system, which is our fight or flight response, causes a heart rate and blood pressure to go up, and the parasympathetic system that is mediated by the vagus nerve is what causes the heart rate and blood pressure to go down. So it is counterintuitive to think how can the vagus nerve, how cause atrial fibrillation? And there's a reason why that happens is because AFib, especially in the paroxysmal kind, which is the, the kind of patient who gets off and on AFib, is a disease of triggers. So these triggers are oftentimes present in the pulmonary veins. Now, those are the veins that bring blood from the lungs to the heart and carry these muscle sleeves that cause AFib to happen. Now, in order for AFib triggers to cause AFib, the atrium should have contracted and relaxed and then be ready for this extra beat that comes in. So, you know, if the atrium is still contracting or the action potential is long, it is less likely for a, a trigger to cause atrial fibrillation. But what happens with vagus stimulation is yes, it brings the heart rate and blood pressure down, but it also importantly shortens the atrial refractory period. So it kind of makes that action potential happen quickly. So then the atrium is ready for another beat to happen. So even though the heart rate is lower, a trigger is more likely to cause atrial fibrillation in the presence of vagal stimulation. So because of that fact, we've seen patients who are, you know, paradoxically healthy patients, athletes or patients who are younger get AFib in the middle of the night when the vagal tone is high. Or sometimes you'll have patients reporting atrial fibrillation after they take a big meal or eat a big meal or have carbonated beverages. So this is because the esophagus is in close proximity to the vagus nerve and in the stretch of the esophagus can cause vagal stimulation and and younger patients or athletes specifically have a high vagal tone as well. So they oftentimes come to us saying, Hey, I'm doing everything right. I'm exercising, I'm healthy. Weight's normal, yet I have AFib. So for these patients, we feel the vagal tone is a significant cause of atrial fibrillation.

Dr. Anthony Kashou: I mean, as you mentioned, you usually, you can see it as sympathetic, but it, it's almost like a, a paradox. But I think the way you, you said that can makes complete sense. Now, what subset of patients with atrial fibrillation can, you know, benefit from this new cardio neuroablation?

Dr. Guru Kowligi: Yeah, so, so in theory, I mean really all patients, if we can get rid of the vagus stone, what happens is the atrial action potential or atrial effective refractory period lengthens and this is something that's been studied extensively in animals and humans. So in theory, all patients should benefit from it because it'll make them less likely to get AFib with these triggers. But in particular, patients who have these features that I mentioned, so you, they're younger, they're otherwise healthy, and they have these vagal triggers where they say, "Doc, it happens in the middle of the night, always I wake up with AFib, or it happens after a big meal or something like that." Those patients are, are particularly those that will benefit from a vagal denervation in addition to what we do normally with the pulmonary vein isolation for ablations.

Dr. Anthony Kashou: Okay. So you would also do the, the PVI as well. Okay. That that's, that's interesting. Yeah, that makes sense.

Dr. Guru Kowlgi: And I'll, if you mention a, I'll mention a study, sorry, for why, you know, that's known because about a decade ago people have looked at patients who just get PVI pulmonary vein isolation versus pulmonary vein isolation and ganglia ablation. And it seems to have an additive benefit to just pulmonary vein isolation or ganglia ablation alone

Dr. Anthony Kashou: In, in terms of the, the whole cardio neuro ablation. Because admittedly, you know, it's been new to me ever since, you know, we began, you know, talking about this, but what's been done in the field and, and honestly where do you see the future of AFib ablation and the management going with this potential option?

Dr. Guru Kowlgi: Yeah, so the field has been there for a while in autonomic has been studied for the last, you know, three or four decades or longer in arrhythmias. But the field of cardio neural ablation, you know, probably began for the first time in Brazil in the late nineties, early two thousands, soon after AFib ablation came about. So, and that was more in the population subset of patients with vasovagal syncope as we discussed those treatment strategies in the separate podcasts. But as they started studying it more, they realized that a high vagal tone causes these changes in the atrial refractory period. So then the thought came, why not add this to patients with who are already getting an AFib ablation? And in the last decade or so, a lot of good work has been done in the field, both in the electrophysiology field with catheter ablation as well as a surgical ablation field where, you know, surgeons when they're doing a maze procedure for atrial fibrillation can, can cause ganglia, can create ganglia ablation and take them out of the equation and then create vagal denervation that way. So all of these studies have consistently shown benefit of vagal denervation in addition to pulmonary vein isolation, to the point where we feel that a standard pulmonary vein isolation when we go around the veins causing electrical isolation of the veins, we probably cause some degree of vagal denervation concomitant without even realizing it. And that is what is in the benefit of the pulmonary vein isolation for these patients. But the idea is to do it more, you know, to plan on doing it and test it before and after. So if we can test the vagal tone at baseline, to the ablation and test it after and make sure that it's completely denervated then there's some studies should suggest that that's a better way of doing AFib ablations.

Dr. Anthony Kashou: Wow. Well, thank you. In today's discussion, we explored this promising treatment strategy of cardio neural for atrial fibrillation. Dr. Kowlgi taught us and shared his invaluable insights into how high vagal tone actually contributes to atrial fibrillation, which was somewhat of a paradox, to me. The patients who can benefit from this cardio neural ablation and what the future of the field holds. Now, we did do a podcast on vasovagal syncope and how cardio neural ablation can be used for that. So make sure go back and listen to that one. That was quite fascinating and something we deal with now, Dr. Kowlgi we always appreciate you joining us and

thank you so much for coming on again, we hope you'll join us again and share us with this field, this growing field that, you know, you're leading forest has to, has to come. So thank you again for all your time and your efforts in this field.

Dr. Guru Kowlgi: Thank you so much for having me. Always a pleasure.

Announcer: Thank you for joining us today. We invite you to share your thoughts and suggestions about the podcast at cveducation.mayo.edu. Be sure to subscribe to a Mayo Clinic cardiovascular CME podcast on your favorite platform, and tune in every other week to explore today's most pressing electrocardiography topics with your colleagues at Mayo Clinic.

Announcer: This has been a Mayo Clinic podcast.