

Announcer: Welcome back to the Mayo Clinic cardiovascular podcast series, interviews with the experts. I'm your host, Sharonne Hayes. I'm a noninvasive cardiologist and vice chair of faculty development and academic advancement for the Department of Cardiovascular Medicine here in Rochester, Minnesota. Today I'm joined by Dr. Barry Borlaug, who is professor of medicine and chair of research for circulatory failure and an invasive and heart failure cardiologist here at Mayo in Rochester. Today our topic is assessing heart failure with preserved ejection fraction. So we now know that probably over half of people with heart failure and disproportionately women have preserved ejection fraction, but the diagnosis is challenging. So welcome Barry to help us sort through this.

Dr. Barry Borlaug: Thank you, Sharonne. It's great to be here.

Dr. Sharonne Hayes: So we know, and you've taught me a lot about how we continue to either miss or under diagnose this condition. So how can we improve upon the diagnosis to enhance detection in these patients now that we have treatments which we'll talk about?

Dr. Barry Borlaug: Yeah, absolutely. I think this is the key point. You know, wasn't until the nineties when we really started to recognize that, you know, there are all these people with heart failure, that the normal ejection fraction that that was possible. And there was sort of a backlash after that. Some people were saying like, well, if you look carefully, there's something else that could be causing their symptoms. A little bit of obesity, maybe some, some low grade lung disease, maybe some coronary disease. So there was this movement against that. But we've really started to recognize more that, you know, obesity along with hypertension and female sex are really key pathophysiologic drivers of heart failure. And obesity, as you know, is an epidemic worldwide, but particularly in the United States. So these people that are coming in who are overweight or obese and short of breath too often are getting neglected or falsely reassured that you're just too heavy or people that are getting older. We know that HFpEF is, or you know, in large part disease, a disease of aging are are told that you're just getting older. That's the reason for your shortness of breath, when in fact they have HFpEF. So that's the big problem is the market under detection of this. And for years we've suspected this, but now there's some new data that really helps us to see that maybe as much as a third of patients with HFpEF out there in the community have no diagnosis. So we've, this has been a big emphasis now, as you say, with spec, with specific treatments to enhance detection, clinical detection of people with HFpEF.

Dr. Sharonne Hayes: So you know, we do have somebody who comes in and they are overweight. Say it's an overweight 55-year-old woman. And, and so aside from yes, maybe deconditioning of being part of this, what are there other things aren't HFpEF that we should be looking for so we can specifically treat them and then kind of circle back to who are the ones we really want to see you or see a cardiologist?

Dr. Barry Borlaug: Yeah, absolutely. You know, so I think it, it is important to step back, I think, and think about what heart failure is and how we sort of gold standard universal definition, which there is now.

And you know, it's signs and symptoms, breathlessness, fatigue, some edema that's related to a cardiac abnormality that's associated with congestion. Congestion is very important and you can assess congestion by physical exam. And when it's really obvious, you see jugular distension and Gallup sounds and things like that. You can look at it by echo, you can look at it by blood work with metric peptide testing. But a lot of times these are all pretty normal. And the gold standard to do that is with invasive assessment in the cardiac cath lab. And about two thirds of people with HFpEF have high cardiac filling pressures or hemodynamic congestion at rest. But about a third, it's only abnormal during exercise. So we've begun to use invasive exercise testing as the gold standard. It really has become the gold standard to make the diagnosis. We used that data to derive a score that you could use in the clinics when you're seeing patients to estimate the probability that they might have HFpEF. So what we did is we looked at a very large series of patients who had undergone invasive exercise testing gold standard to determine who does and who definitely does not have HFpEF. And then we, we derived the variables in this score that were significant predictors of having HFpEF or not having HFpEF. And we came up with what's called this H two HFpEF score. And if the score is high, it ranges from zero to nine, it's based on six variables, four clinical variables, and two echo variables. And if the score is 6, 7, 8, 9, you can basically take it to the bank that they have HFpEF. If the score is zero, it's very, very unlikely. If it's one, it's pretty unlikely. If it's two to five, you need some further workup. So this is just a way that everybody can use in general cardiology clinic and primary care clinic to estimate if somebody's coming in with breathlessness, what's the prob, what's the probability? It's a very bayesian approach. And if it's in that intermediate range, you need to refer on for additional testing to make a workup.

Dr. Sharrone Hayes: Yeah. So they need an echo and a clinical evaluation, and then we can use this score to kind of decide next steps. Right? So obviously cardiologists, we, there's not enough car cardiologists in the US for everyone to see every breathless patient. So I think just having this score could really help. But, but score or not, when should these folks see a cardiologist and then when do they need to see somebody like you? Really an expert in this?

Dr. Barry Borlaug: So the score is four clinical variables. So the presence of obesity is worth two points. Any history of atrial fibrillation, which is very common in HFpEF is worth three points. So any history being age 60 or greater is worth a point. And hypertension requiring two drugs or more is one point. And then there are two things from echocardiography estimated right ventricular systolic pressure of 35 or greater, and then an EE prime ratio of 10 or greater. So the highest score possible is nine, as I said before, six is very, very likely if you've got somebody who's got one of those intermediate scores, a score of three, a score of four, a score of five, that's somebody you'd wanna refer on to, to make, to ensure the diagnosis. A score of five is associated with a 75% probability that they have 75 to 80% probability. So in some ways you could say you probably have HFpEF, but if you want, you know, that certainty you can refer on for additional testing. That could be the gold standard, as I mentioned, would be referring to the cath lab for invasive exercise testing. And that's frequently we do here at Mayo, those patients with intermediate pretest probability to get the, the definitive diagnosis with invasive testing. Other groups have used exercise echocardiography, which has some value, but can have some equivocal results too. So there's some disagreement in the literature there, but that's another possibility or sort of a tiered approach. But really it's based on those patients that have sort of intermediate. So maybe they, they're a

little bit older and you know, they're obese, but other findings are not quite clear. That would be somebody with a score of three, for example, and they would, they would merit further evaluation. So I think a lot of it depends on what's available locally. Not all centers have the capability to perform invasive hemodynamic exercise testing. So exercise echo could be done in that setting with referral on to another center if necessary, for example.

Dr. Sharrone Hayes: Can you, for, for those of us who don't accompany you into the cath lab, can you share a little bit about the actual kind of just a, a thumbnail of the study that you do on these suspected intermediate, say intermediate patients? What, what are you looking for and what do you have the patient do?

Dr. Barry Borlaug: Yeah, that's a great point. Great question. So, you know, again, the gold standard is an elevation in left atrial pressure or LV and diastolic pressure, which we measure in the cath lab is the pulmonary capillary wedge pressure. So we gain access to the right heart, usually through the jugular vein, balloon tip catheter, measure the pressure in the right atrium, right ventricle, pulmonary artery. And then in the wedged position, which is our surrogate for left atrial pressure. And we do that at rest. And then we do it during exercise in our laboratory, we also perform metabolic measurements of oxygen consumption and carbon dioxide production. So it's like a C PET essentially in the cath lab. Sometimes we also bring echo in, but what we're looking for is an elevation in that pulmonary capillary wedge pressure. If it's 15 millimeters of mercury or greater at rest, that makes the diagnosis. But as I mentioned earlier, about a third of patients with HFpEF, it'll be normal at rest, but it only becomes abnormal during the stress of exercise. So they're, they're sort of euvoletic, they're not like volume overloaded, but they can't engage in physical activity without the cost of high filling pressures. So then if we're looking for a wedge pressure of 25 or greater during exercise, that then also satisfies the diagnosis. If they don't meet either of those thresholds, then we've excluded HFpEF and then we should be looking down other avenues, deconditioning or, you know, other rare causes, lung disease, et cetera.

Dr. Sharrone Hayes: We clearly need to, now that we have tools and we'll talk about in detail about some of the new treatments in a future podcast with you, but maybe just mention why, you know, give a little background on why we're, we're doing this and kind of what's next. There aren't enough of people like you, Dr. Borlaug's, who are doing these exercise tests. I mean, you intimated it, but I, I suspect that access to anything beyond exercise echo is probably limited to a lot of the people who are watching this podcast. So I, I think perhaps what's your pitch for why they should continue to try to make this diagnosis?

Dr. Barry Borlaug: Yeah, well let me, I mean, so for years we did this, when we started doing this testing, I'd get that question from the somebody in the audience. Like, well, there's no proven effective treatment for HFpEF, so why are we doing this? Right? And the answer at that point was because people wanna know what's wrong with them. And that has great value. And I can't tell you how many people, especially women in their, you know, fifties or sixties and it's like their fourth opinion and they just

consistently are told that, you know, like the things I said earlier, they're too heavy, they're getting too old that, you know, it's in your head psychological and just in tears when they find out 'cause they're the value of knowing the validation of having a real organic cause for symptoms that in, in itself can be very therapeutic. So for for years, that's all we had and that still is very valuable, yes. But beyond that, now we have proven treatments and that clearly reduce the risk of heart failure hospitalization or cardiovascular death. And that clearly improve health status, reduce symptom severity, improve exercise function. So these are all the things that we want to do. So it's, you know, we can no longer lean on that crutch, like, well, there's nothing you can, you can do about it anyway, because now we can do things about it. So we owe it to our patients to know what, you know, what's causing it, is it heart failure? And really the onus is on us to make the diagnosis so we can treat them correctly, which as you say, we'll talk about in a different podcast, you know, doing this invasive studies, it used to be very much a niche thing, but the number of laboratories that have this capability is really increasing. It's being perceived as more of a, an indicator of a really strong lab that, that can do this. So I would say a lot of tertiary medical centers around the country now have this available. You know, this was how it was with the start of PCI too, you know, it was very rare that people could do, you know, angioplasty for coronary artery disease. So it's, you know, once we see that the value, the the availability will continue to increase. So I don't think we can use that as an excuse anymore.

Dr. Sharrone Hayes: Yeah, and I agree with you, Barry, that the, the value of validating symptoms and telling somebody that they, what they have and that their experience is real is, is worth it. Right. Even if you don't have a specific treatment. 'cause I would say the same thing with microvascular dysfunction. Yes. And a few other relatively understudied conditions because they occurred predominantly in women and we, we weren't digging in for that. So, you know, now we have twice as much, but I, I agree with you. Even before we had treatments, it was worth it. Yes. In my opinion. So exciting stuff and thanks for making the case for why we should care and why we should push to get a proper diagnosis for these individuals that we all see and if we reflect on our practices have been seeing for a long time and probably we're missing.

Dr. Barry Borlaug: Yeah.

Dr. Sharrone Hayes: So thank you very much, Barry, for joining us today.

Dr. Barry Borlaug: My pleasure. Thanks for having me.

Dr. Sharrone Hayes: This wraps up this week's episodes of interviews with the experts. I'd like to thank Dr. Borlaug for joining me today and discussing this really important topic. We look forward to you joining us again next week for another interview with the Expert. Be well.