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www.reachmd.com
info@reachmd.com
(866) 423-7849

The Aorta Center at Penn Medicine: An Inside Look at a Comprehensive Model of Care

Announcer:

You're listening to *Medical Breakthroughs from Penn Medicine* on ReachMD, advancing medicine through precision diagnostics and novel therapies. Here's your host, Dr. John Russell.

Dr. Russell:

The aorta in aortic valves pose a unique set of challenges for cardiologists and can lead to significant problems for patients. That's why the Aorta Center at Penn Medicine has brought together a range of disciplines to offer a comprehensive model of care for patients. And this new center will be the focus of today's program.

Welcome to *Medical Breakthroughs from Penn Medicine* on ReachMD. I'm Dr. John Russell, and joining me today to take a look at Penn Medicine's Aorta Center is its co-director, Dr. Joseph Bavaria. Dr. Bavaria, welcome to the program.

Dr. Bavaria:

Thank you. Glad to be here.

Dr. Russell:

So can we start with some background, Dr. Bavaria? What got you interested in building the Aorta Center of Penn Medicine, and what were some of the primary goals of this project?

Dr. Bavaria:

Well, we've had an aortic program, but it's been a little bit segregated, and not quite completely gelled. What I really wanted to do was to bring together all the components of aortic disease and especially all the caretakers, the practitioners, the nurses, the doctors, the scientists, the database managers, everybody who's interested in aortic disease, bring them all under one umbrella so that we could kind of go to A plus from, say, B plus. This was the initial thought. We got to the point where we were doing very well. And we're a very well-known international and national aortic center. But we needed to kind of get to the ultimate level. And that required, creating the Penn Aorta Center and wrapping around all the aspects of the aorta in a 360-degree fashion. Kind of like, the aorta is the center of the solar system, and all the different components wrap around it, and we're going to hit every single one of those.

Dr. Russell:

So what makes the Penn Aorta Center model of care different than other aortic programs at other academic medical centers across the country?

Dr. Bavaria:

I think the main word here is comprehensive. It's a very comprehensive aortic center. And it's a very comprehensive strategy. For example, we have the aorta, it's amazing how many people die from aortic disease every year. It's kind of underappreciated. Frankly, our imaging and our ability to diagnose is not that great. For example, there's been some recent studies showing that if you take all the cardiac arrests and sudden deaths in emergency rooms, over 8 percent of them are from aortic disease. Now, that's never been understood before. So many of these MIs and heart attacks et cetera, that we thought about in the past many, many of them probably were aortic disease.

But what makes a difference is the comprehensive component. So, we not only look at different disease processes of the aorta like syndromic conditions, which is things that are inherited and are genetic, we look at different things like bicuspid aortic valve, we look at dissections, which is catastrophic, both basically lifetime management of dissection aneurism in its pure form and all kinds of different

areas that are more anatomic and disease based.

Dr. Russell:

So now I'd like to focus on one key component of comprehensive care, and that's a multidisciplinary approach. So, Dr. Bavaria, what are some ways the Aorta Center of Penn Medicine is utilizing multidisciplinary teams in care coordination?

Dr. Bavaria:

Well, we have a number of different ones. So, I think the most ambitious one, and the one that's very important, is the syndromic conditions. So, for example, we have nurse practitioners, cardiologists, geneticists, which is the key thing, as well as cardiac surgeons, and vascular surgeons all in the clinic together regarding syndromic conditions. Now that would be genetically triggered aortic conditions, which you're born with, such as Marfan Syndrome, Loays-Dietz, and there are a whole bunch of them. These patients not only have aortic disease, but they have a lot of other issues as well. So, the multidisciplinary approach is kind of a holistic approach to the entire patient.

Now, it's true that that it's the aortic condition that usually causes death of these patients. That's the reason why the cardiac surgeons are so important. That's just an example of a really broad-based multidisciplinary approach.

But others also like dissection clinics. We kind of segregate or try to segregate dissection patients because they're so complicated. With cardiologists and imagers, cardiac and aortic imaging, as well as the cardiac surgeons and the nurse practitioners who are involved. This is about antihypertensive management, lifelong management of patients with dissection and really detailed complex imaging, both obtaining the images and reading the images. So that's another multidisciplinary clinic that's a little bit different than the syndromic clinic.

And then another one is bicuspid aortic valve. Now, that's a kind of a syndromic-like kind of thing. But it's so common that we segregate it out. And that has a part of these patients being quite young. We have a part of that which has to do with a young women say, for example, who have a bicuspid valve and some other aortopathies and are in pregnancy. So, there are conditions that are specific to bicuspid aortic valve and its associated aortic disease that are separate and require, a different multidisciplinary look, even including, in some respects, obstetrics. So, those are just three examples. And we can just keep on going on and on about the different presentations of aortic disease in the thoracic aorta, it's pretty broad based.

Dr. Russell:

For those just tuning in, you're listening to *Medical Breakthroughs from Penn Medicine* on ReachMD. I'm Dr. John Russell, and today I'm speaking with Dr. Joseph Bavaria, about Penn Medicine's Aorta Center and how it's helping patients with aortic diseases.

So Dr. Bavaria, let's now dig into some of the particulars of the Aorta Center at Penn Medicine, specifically endovascular surgery. How are you and your colleagues at Penn Medicine's Aorta Center working to expand endovascular possibilities for aortic patients?

Dr. Bavaria:

That question is answered on multiple levels. The first one is we have a brand new hospital, we knew about this for a few years now. So, we just built a new hospital that has plenty of endovascular capabilities regarding imaging, fixed imaging, so we can actually perform the operations in state-of-the-art facilities. And not only that, but we have enough of them. The entire field is going slowly but surely towards endovascular repair. And you just have to have the right infrastructure for this. So, we have that in place in spades. And it's very deep, and it's very nuanced, and these endo suites are really spectacular.

And I think the last thing is that, and this is really important, we're pretty advanced in the sense that we're moving up into areas of endovascular technology in parts of the aorta that are brand new, for example, the ascending aorta, thoracic aortic dissection the aortic arch, thoracoabdominal aorta. Now, none of these are ubiquitously available right now in the United States of America. Most of these are on what we call physician IDEs, or they are on a sponsorship through trials in the FDA at various levels. So, we have access to almost in all those regions of the aorta, which gives us the ability to treat our patients in a way that most places can't. And this does tie into the whole clinical research realm and the concept of clinical trials.

Dr. Russell:

So doctor, you had mentioned that you have a sub team that just focuses on bicuspid aortic valve disease at the Aorta Center of Penn Medicine, and they work on valve-sparing surgery. Can you tell us about Penn Medicine's expertise in these areas, and why it's important that these patients are referred to a comprehensive aorta center?

Dr. Bavaria:

First of all, the big thing is that bicuspid aortic valve is incredibly common. It's approximately 0.5 percent of the entire population, which is a lot. So, we're talking about a million and a half plus people in the United States who have this. And it hits people - the average age, for example, that we operate on, for general bicuspid aortic valve disease is like 52 or 53. And for valve-sparing surgery, which you

mentioned, the average age is actually in the mid-40s. So, it's a very, very common disease.

The thing about it is that a substantial number of patients with bicuspid aortic valve will have both a valve issue and an aortic issue, and they'll have a leaky valve. So, these are the patients that do not have a tight valve. With a tight valve, we have to just do a replacement. But for a leaky valve, we can repair those valves. That's the key concept.

Now, this is a pretty new reconstructive situation and has only been around for 10, 15 years. It's kind of only been around kind of in a mature form in the last 5 to 10 years. We here at Penn Medicine in Philadelphia run the largest North American valve repair course, which is for three cusp and two cusp bicuspid aortic valves in the entire continent. Now we haven't done it for COVID, but ever since 2015, we've been doing this. So, we have a large experience with bicuspid aortic valve repair, which is especially important in these young patients.

Dr. Russell:

So doctor, what kind of research is the Penn Aorta Center conducting? And how do you think this research will impact national treatment guidelines and best practices going forward?

Dr. Bavaria:

We're doing a lot of research. The one that you mentioned that's interesting is the guideline research. So in other words, this is research that will impact the guidelines, especially regarding aortic disease and bicuspid aortic valve disease.

So, we have what's called the Aortic Valve Insufficiency, or AI project. That's a big clinical and imaging project with natural history of the disease that's ongoing. This is a big research project.

We also have research projects, as I mentioned earlier, utilizing endovascular surgery in all parts of the aorta that have not been tackled before. This includes ascending and arches and thoracoabdominal aortic, as I said. So that's part of our clinical research paradigm the endovascular approach.

The other thing is that we're doing a lot of research in is clinical research in syndromic conditions which is the things that people are born with, as well as aortic dissection. With aortic dissection, it's mostly large database management and trying to figure out well, what's the best way to treat these dissections? How can we treat the dissections in their entirety because this is a catastrophic situation, these aortic dissections. And we need to do better at treating them as an entire community of aortic surgeons across the world.

So, these are the various different areas in the research world that we're working on.

Dr. Russell:

So before we close today, Dr. Bavaria, can you share some key strategies or takeaways that might help other organizations and teams across the country who are caring for patients with aortic diseases?

Dr. Bavaria:

Well, I think the main thing is if you don't quite have the resources to do something incredibly comprehensive, what you can do is have a couple of interested care givers. And this includes a cardiac surgeon, a cardiologist, maybe an internal medicine or geneticist who's interested in syndromic conditions, and a nurse practitioner, some nurses. And then get together as a team and start treating patients in a comprehensive fashion. Some of that also has to do with the surgeon, has to have the experience. And not only that, but maybe some of the training to do these operations safely. Because they are a little bit intense. Aortic surgery is a little bit more serious than a lot of other surgery because the problems associated with it are somewhat catastrophic. In other words, there's bleeding, exsanguination, stroke, and death.

It's serious surgery, serious heart surgery and serious vascular surgery. So, you have to have the right components. But it's a very excellent field, it's a great field. Patients really really appreciate it because they know that this is a bad disease. As a matter of fact, we just were talking about some research and having some research that's just being presented at some of the big meetings recently about the fact that having just the mere presence of having an aortic aneurysm diagnosis is almost like having a posttraumatic stress disorder. And so, the patients really do appreciate a very loving and caring and intense relationship with their aortic team.

Dr. Russell:

Well, you certainly have great passion and skill and love of aortic diseases. So, I want to thank you for joining me today. A great way to end our discussion. With those final thoughts in mind, I want to thank my guest, Dr. Joseph Bavaria, for speaking with us today. Dr. Bavaria, it was great having you on the program.

Dr. Bavaria:

Thank you very much.

Announcer:

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