

[MUSIC PLAYING]

**KATIE** I'm going to talk about something that we have not talked about yet this morning. And I'm going to add to a couple of the talks that have been given already with little pieces of information. And I'll start by saying, I know that this is not something that everybody in cardiology or in surgery is comfortable with. These humans are often maybe aliens in some ways, because we are not obstetric specialists. And so I want to give us just a couple pieces of information for us to think about when we are managing aortic aneurysms and pregnancy. I'll start by saying, I have no financial disclosures.

And we're going to start off with a patient that I saw over telemedicine, actually, a few months ago. And she was my 11:20 in the office that morning. Later in the morning, it was a busy day. She's a 27-year-old female with known Marfan syndrome, currently 11 weeks pregnant, which, if you practice what I practice, that should scare you immediately or at least catch your attention this late in the morning.

So she's now-- now, I'm going to get your attention even more. She has three prior pregnancies. 2016, she had a vaginal birth at 38 weeks with an echo that showed an ascending aorta of 3.9 centimeters. In 2017, she had another pregnancy that showed an echo with an ascending aorta now of 4.2 centimeters. You guys are probably picking up on the pattern at this point in 2020.

Then, she had a c-section, this time for breech only, not because of anything else. Although, we will talk about discussions as to delivery choices. Her ascending aorta at that point was 4.4 centimeters. And she was coming to me today-- reminder, she's 11 weeks pregnant. So she's not followed with cardiology since, which is a point to what you were saying, which is we focus on our children oftentimes and not ourselves. And unfortunately, her last echo showed an ascending aorta of 4.7 centimeters.

So with this in mind, we will talk more about ascending aortic aneurysms during pregnancy. My hope is that by the end of this talk, you'll be able to identify two things that you personally can do to decrease the risk of a patient who has an aortopathy and can become pregnant. I would like you to be able to name appropriate imaging modalities during pregnancy and then identify the period of time that is highest risk for a pregnant patient with an aortopathy.

So let's talk a little bit about pregnancy. I know that is not the common thing that we are thinking about. But a reminder, because it's really important. So let's go back to medical school for a moment and talk about what changes occur during pregnancy. So during pregnancy, our cardiac output increases. Our stroke volume increases. Our blood pressure decreases a little bit. Usually, our heart rate goes up, and our peripheral vascular resistance goes down. Now, that's one thing to keep in mind during pregnancy. And then, remember, pregnancy is not a chronic condition.

So we get to delivery and postpartum state. So what happens at delivery? Look at that blue line. We're going to come back to that cardiac output at the very end of this talk when we talk about mode of delivery. That goes up and down, when you think about pushing and contractions. The mode of delivery will be delivered-- will be-- we'll take this in mind as we think about that. And then, in the postpartum state. So these should be background pieces of information that we consider when we are thinking about managing pregnant patients.

Now, if you are talking about this-- this is yet another thing that I know most of us do not think about-- I also-- regardless of whether your patient is pregnant or not, if they have the ability to become pregnant, you need to talk about these things. You need to talk about the possibility of pregnancy. You need to talk about contraception.

Now, I am in a room, fortunately, of maybe like 50% men and women. So one of the things that I'll talk about now, if you don't recognize all of the methods of contraception here, I will not fault you. But I do want to bring into question here that there is other modes of contraception available, that it is not just women who can think about contraception, and so that we can think about this when we think about when we talk to all of our patients with regards to risk.

If they have a known aortopathy, these are things-- we should talk about pregnancy. We should talk about contraception and what those things are. If you don't know or feel comfortable talking about contraception to your patients or their families, get help. There's plenty of us who are willing and able to talk about those sorts of things.

So which aortopathy is highest risk for dissection? Well, given a lot of the conversation that we have had this morning, it will be no surprise that Marfan syndrome is the highest risk for dissection. And this was a study that was put out in 2021 from the international registry of aortic disease and this-- or dissection. And it very clearly shows-- it's a small study-- to what Arvind was talking about before.

When we talk about adult congenital disease, we do not have a lot of patients. But this study was what the information that we have to go on. And of the patients that were included in this study, 29 of them, the large majority of them had dissection in third trimester and the postpartum period. So that is 23 of the 29 had dissection in the third trimester and the postpartum period. Remember, that's one of the things that I want you to learn from this talk is to identify the time of pregnancy during which that they are at greatest risk.

So we'll highlight here that this is Marfan. Remember, the patient that I spoke about in the morning was a patient who had a diagnosis of Marfan's. But remember also that bicuspid aortic valve is very common down here, low risk-- lower risk of dissection, but not zero risk of dissection. And then, here, importantly, as we were talking about genetic screening and other things familial screening, there is no aortopathy diagnosis in a large portion of the women in this trial. So just something to consider when we are thinking about pregnant patients. If you are at all concerned, it's really important to get more information on them, including imaging.

So Kerry's pregnant already. Now what? Now, we-- I gave you information about her echoes. She had no other imaging modalities in her chart. And what I want to highlight here is when we have to image pregnant patients, it is important to image pregnant patients at every single trimester and in the postpartum period. Remember, the reason that we do that is because the risk of dissection is just as high in those immediate 12 weeks postpartum.

So we typically do this with a transthoracic echo. But to both Josh and Chris' point, we cannot see all of the aorta. So in patients like Kerry, if I haven't seen the entire aorta, and I really want to measure all of it, I'm going to go for the MRI. So I'm not going to choose the CT scan, because that has radiation. And during pregnancy, we need to think about radiation.

Also, we do not give gadolinium during pregnancy. So you have to do an MRI without gadolinium. And that allows us to see the entire aortic arch. Sometimes, with my bicuspid aortic patients, I'm trying to think about any sort of abnormality of their aorta at that point in part that I can't see on a transthoracic echo. So these are the three-- these are the two imaging modalities that I'd like you to remember and to use if you have a patient with any sort of known aortopathy during pregnancy.

All right. Does medication help? Now, I believe we started the morning with Arvind talking about beta blockers. So we do think that beta blockers are appropriate for patients to decrease the risk of their growth as well as the dissection. There are no standardized randomized controlled trials for this. But when we look at the groups of people of women that are taking beta blockers, they have less growth if they are on beta blockers.

Beta blockers are safe in pregnancy. Just to let you know, the ones that we use are labetalol and metoprolol. They are associated with slightly lower birth weight. And that is dose-dependent. So the higher dose of beta blocker that you use earlier on in pregnancy increases the likelihood of lower birth weight. So consider it, though. This is something really important.

But remember, when we talked about pregnancy, their blood pressure goes lower, typically more in the first trimester. And so sometimes, they cannot tolerate that from a blood pressure standpoint. It's also really important to consider the other risk factors that occur in our patients, such as hypertension. So monitoring blood pressure and treating, importantly treating, hypertension.

Now, there was a big trial that came out last year called the CHAP trial that really changed the way that we manage pregnant patients with high blood pressure, showing us that there is benefit to keep their blood pressure less than 140 over 90. Now, when I grew up and I was in medical school, that was not the number that we were taught. So this is a new number. It should keep our attention very, very close to blood pressure. Treat less than 140 over 90.

And that's for all comers. That was not for patients with aortopathies. That is really for patients with high blood pressure during pregnancy. I consider-- and I'm just going to put a star. I probably should have put a star on this slide. For my patients with severe aortopathies with enlarged ascending aortas or growing ascending aortas, I try to even get them down to 130 over 90.

Now, I have to talk to my maternal fetal medicine colleagues when I am doing that. They don't really like low blood flow because of the perfusion of the fetus at that point in time. But 130 over 90 is less likely to cause any sort of harm. And if we are treating hypertension and trying to avoid increasing the size of the aorta, really, that is the goal. A side note, for patients who do have hypertension, we are also using baby-dose or low-dose aspirin to decrease the risk of severity of preeclampsia. But that is not specific for aortopathies alone.

All right. We're going to get to delivery, which is the part that I know most cardiologists and surgeons are like, not me. I'm not it. I don't want to think about this or talk about this. But it's a really important thing for us to think about when we are managing patients who have known aortopathy. And that's because of really that top line, that blue line, which is the cardiac output. It really increases and goes down and increases and goes down. And as we were talking about, these things are really important to consider when we think about harm that can be done to the aorta.

So c-section, if they have known prior dissection, that's pretty easy, or if their aortic size is greater than 4.5. Those are the things that you will recommend. That's standard cardiac reason for a c-section. Vaginal delivery is acceptable if the aortic size is less than 4. And now, I'm going to get into the part that most cardiologists are like, oh, gosh, we're getting complicated, complicated discussion of delivery.

So vaginal with assisted second stage, that means either vacuum or forceps, limited pushing and an epidural, really, I recommend for everybody with an aortic size between 4 to 4.5. That is something that you have a discussion about with your entire team. We'll talk about what the entire team is comprised as but-- comprised of.

I did not go into timing of delivery. For these patients, if we are concerned about a patient, we obviously deliver them a little bit earlier than on the later side. But that is something also to consider when we are talking about delivery and mode of delivery as well as timing of delivery.

I'm going to pause for a second and say, if any of this has made you uncomfortable, there is help. So if you have a patient who might become pregnant, is already pregnant, we can help you. So all patients with aortic aneurysms or increased risk of dissection should be managed by an interdisciplinary team. This has been something that is well discussed and well published, as cardio obstetrics is a new trending area within cardiology.

We have a nice model of care over on the left-hand side that was published by a friend and colleague, Melinda Davis, and back in 2021. And it's a big group of cardio obstetrics team and patient. And really, that's what we need in order to manage these patients. I will say, we are lucky to have this here at UPMC. In the Magee-Women's heart program, we have all of those circles, every single one of them.

But if you are at a place that does not have every single one of them, the one thing that I must say you have to have is maternal fetal medicine, a cardio obstetric expert, and an anesthesiologist. You must have those three things. If you don't have the rest of the bubbles, I can accept it. But you must have those three things if you are managing a person who has an aortic aneurysm or an increased risk of dissection.

Now, this is the fun part. You get to this point. And there's a screaming baby, and you're like, you know, I feel good. I feel good. But what I want you to think about is to be this person. Be this old lady who is tired from watching the aorta, the entire pregnancy, who's tired from worrying about her patient, and her blood pressure, and all of the symptoms that she is having. I encourage you to keep your eyes on the aorta in the postpartum period. Remember, that is the still the high-risk period where we can have a dissection and where we can have growth of an aorta.

And those things, it's the same thing. So I'm going to go back and just say, it's an echo or an MRI without gadolinium. Those are the things that we would like to continue. And that's because they're breastfeeding at this point. So we're not going to use gadolinium at that point in time. While radiation can be safer at that period of time, both an echo and an MRI, and that allows for comparison between studies.

Last but not least, when to recommend surgery before pregnancy. Now, in our Marfan's patients, which is Kerry, we should be recommending surgery before pregnancy at greater than 4.5. And I'll remind you that she came to me 11 weeks pregnant with 4.7 centimeters measured on her most recent echo. Marfan's with risk factors, we do it earlier.

Loeys-Dietz, both 1, 2, and 3, depending on whether or not they're 4 to 4.5 is when we do surgery. And that's really helpful if we have genetic testing. We do not always have genetic testing. 4.5 for our non-syndromic aortic disease. Turner syndrome is less. That is because Turner syndrome patients have shorter stature. And so we go by sized indexed to their height.

And then, last but not least, bicuspid aortic valve, and I have two stars there because even though the guidelines say greater than 5.0 centimeters for surgery prior to pregnancy, there are some things that make patients who have a bicuspid aortic valve with an aortopathy higher risk. And so if they are growing acutely, if they have grown with prior pregnancies, that is when we want to do surgery beforehand. And I will say, I wish I had met Kerry earlier in her life. We would have not only talked about contraception. But I would have also talked about surgery at that point in time.

Last but not least, I just want to bring to everybody's attention, these guidelines came out this year. I was very excited. I emailed Arvind I think within an hour or two of them getting posted about section eight. Section eight is the pregnancy section. And this was the one that I really like.

But the takeaway points for us today, discuss the risk of aneurysmal growth as well as dissection. If you have patients who have aortopathies, please, please talk about contraception, so that we can be thoughtful about a pregnancy. If they are pregnant, image during and after pregnancy with TTEs or MRIs without gadolinium.

Heightened awareness throughout pregnancy, but really third trimester and the 0 to 12 weeks after. Treat hypertension. Remember, less than 140 over 90 is your number. Read those guidelines. And always call for help. I am happy. I'm actually putting my cell phone number up there. Please call me for help if you have a patient who scares you. I am happy to help take care of her. Thank you.

[APPLAUSE]