Cicely Ann Dye:

Welcome to the American Heart Association Exploring Supraventricular Tachycardia podcast series. I am Dr. Cicely Ann Dye. I'm currently the chief of cardiology at Naval Medical Center in San Diego and director of the Electrophysiology Lab, and I specialize in maternal and sports cardiology.

Before we begin, let's review the learning objectives for this podcast. Today we will discuss the epidemiology of SVT, PSVT in pregnancy, explore its impact on maternal and fetal outcomes, and identify acute and chronic treatment options. We are joined today by our distinguished colleagues, Drs. Kamala Tamirisa and Annabelle Volgman. Dr. Tamirisa, can you please introduce yourself?

Kamala Tamirisa:

Thank you so much, Cicely. This is Dr. Kamala Tamirisa, one of the cardiac electrophysiologists with Texas Cardiac Arrhythmia in Dallas, and I have started cardio obstetrics programs in here and I was in Ohio before this, so I started those programs and I am passionate about it. So thank you so much for the invite.

Cicely Ann Dye:

And Dr. Volgman.

Annabelle Santos Volgman:

Hi everybody. Thank you, Cicely, for inviting me to be on this podcast. I'm Dr. Annabelle Santos Volgman. I'm a professor of medicine at Rush University Medical Center. I started the Rush Heart Center for Women 20 years ago, and I am a trained electrophysiologist, but I do not do procedures for a while now, but I continue to see a lot of patients with arrhythmias. Thank you.

Cicely Ann Dye:

Thank you. We are excited to have you here and let's get into it.

First we're going to start off with a case presentation. This podcast will examine the case of a 22-year-old woman, a G1P0 pregnant woman who came in with a narrow complex tachycardia. So first she presented to the emergency room initially with intermittent palpitations. These palpitations have been going on for years and years, but over the past couple of years, and particularly in pregnancy, she's noticed that they're becoming more frequent and the duration has been longer and longer. She denies any syncope associated, but she has had some decreased exercise tolerance. She feels like that could be associated with the palpitations, but also it is hard for her to tell the difference between what's associated with pregnancy and with the palpitations. During these episodes, she feels very lightheaded and feels nauseous and even sweaty before termination, but she denies any kind of chest pain or losing consciousness. She's had a normal pregnancy thus far and she's about 32 weeks pregnant.

Prior to this pregnancy, she's been otherwise healthy. During the evaluation for her palpitations early in her pregnancy, she was noted to have a bicuspid aortic valve but did not have any kind of enlarged aorta. This is about her third visit to the emergency room in the last four weeks, but this is the first time they were able to obtain an EKG that was associated with her symptoms. In the past, she's wore a monitor, but also the monitor didn't show any arrhythmias. So on the EKG, this patient has an SVT where she's going about 203 beats per minute.

Before we get into the particulars about this case, we'll have Volgman talk to us a little bit about SVT and why it's important in pregnancy and why we're discussing it during this podcast.

Annabelle Santos Volgman:

Thank you so much, Dr. Dye. That's a very interesting case and it is a common case in young patients with palpitations during pregnancy, and we have to make sure that it's not just a physiologic response to the pregnancy. As you know, heart rate goes up, the cardiac volume goes up, and so there's a lot of neurohormonal changes that increases the risk of arrhythmias. Whether they're benign or malignant is really dependent on how the patient's condition prior to the pregnancy is. If they have a congenital heart disease, such as this patient, her risk would be higher for a lot of different arrhythmias. So we have to be really careful about taking care of these patients.

As you mentioned, she had had many episodes of palpitations, but no arrhythmia was documented during the monitor. This is where monitors that are personal monitors can really come in handy. You can find these monitors that you can just buy on your own, and it's really helpful for young women to document their arrhythmia so that they are not dismissed in the emergency room or by their doctors because these arrhythmias can be very dangerous, especially in patients with congenital heart disease.

But even in patients without any heart disease, they can have arrhythmia such as paroxysmal Supraventricular Tachycardia, which are usually from the AV nodal reentrant tachycardia or the AV re-entry tachycardia in patients with Wolff-Parkinson-White syndrome. And those patients need to be treated aggressively because they can keep recurring and especially in patients with Wolff-Parkinson-White syndrome, or WPW, they can go into atrial fibrillation, which could be very dangerous.

Another form of Supraventricular Tachycardia that is not as common as atrial tachycardia. There are different kinds of atrial tachycardia and they can be brought on by the neurohormonal changes that we see in pregnancy.

And then, of course, atrial fibrillation is another type of arrhythmia that we have to be cognizant of, which is a Supraventricular Tachycardia, specifically atrial fibrillation and atrial flutter, that occur in patients with congenital heart disease or some kind of heart disease before the pregnancy or during the pregnancy with peripartum cardiomyopathy. Thank you.

Cicely Ann Dye:

Thank you. I noticed that you talked a little bit about emotional support and patients not being dismissed in the emergency room. Kamala, could you just talk to us a little bit about disparities in healthcare before we start talking about our EKGs?

Kamala Tamirisa:

Absolutely. It's a very relevant question because there are a lot of disparities in the access to care and the disparities in also outcomes. So several articles have been published in this space looking at the severe maternal morbidity and not just focusing on the mortality. We all got to remember that the morbidity is about 50 to a hundred times higher in non-Hispanic black women, and this risk actually starts even the pre-pregnancy. So the risk is there. So that's where we can intervene and focus on the preventive measures. And of course, that risk continues during pregnancy and postpartum. Not only is it purely non-Hispanic black women, but we need to tie that to also the socioeconomic disparities. Lower income women have been shown to have higher mortality and morbidity during pregnancy.

And the third thing I will say, since you used the word disparities, I mean age-related disparity in presentation is important. We've got to remember, older women over the age of 41 tend to have a higher risk of SVT than the younger women. There was actually a regional study in Massachusetts looking at disparities with regards to starting from pre-partum during antepartum and postpartum, and

they found that there was a 60% increased risk of hospital admission in the year before the pregnancy if women had SVT, and this was more commoner in black women who are pregnant.

So the disparities exist, and we all know that social determinants of health just span not only from the disease presentation or pathophysiology, but more so from the socioeconomic access to care, bias, and all the other issues we look at in several other heart disease aspects. So I don't think cardio obstetric space is in silos. It's we see the disparities. We need to practice keeping those demographics in mind and when we care for our patients.

I'm going to pause there if that's okay, and I'm just going to ask Dr. Volgman, Annabelle, could you add anything more to the disparities before we go on?

Annabelle Santos Volgman:

Yes, I think there's a lot of information about the African-Americans having a high risk of maternal mortality. Interestingly, the Hispanics have less maternal mortality than whites actually. However, we cannot dismiss the other groups such as the Native Americans and the Alaska Natives and the Hawaiian Natives and Pacific Islanders. They have a high maternal mortality and morbidity. So we cannot dismiss those groups of women. Thank you.

Cicely Ann Dye:

Thank you, ladies. As we move forward talking in particular about SVT, can you tell me a little bit about the normal EKG changes in pregnancy? And then after that we can discuss three types of SVT, being AVNRT, AVRT, and atrial tachycardia.

Kamala Tamirisa:

Thank you. So yes, during pregnancy, the P wave duration actually prolongs. What is the significance of that? Probably dilatation of the left atrium and the atria due to the volume and there's more to it. The PR interval also shortens during pregnancy. The third thing we see is as the pregnancy progresses more and more, the gravid uterus, cardiac silhouette becomes almost like a horizontal leading to left-axis deviation, and we see some ST-T changes, T wave inversions, which are nonspecific.

One thing is as the pregnant woman progresses, we know the sinus tachycardia, just the baseline heart rate, increases, but you would think that the QT should get shorter, but the QT, actually it's longer in the second and third trimesters. So that's something we need to keep in mind. And not that it's pathological, but just if you're using medications for concomitant depression or something else, we need to keep an eye if you're managing SVT with other medications that do affect the QTc interval.

And there's the last thing I'll say. The indicator for the dispersion of repolarization, it's an interplay of sympathetic chance and also mostly the catecholaminergic triggers in the third semester. So alterations, we all have to remember that these are all physiological, but if we are using medications to treat SVT, these all do play a role when we are measuring those intervals.

Cicely Ann Dye:

Thank you. Now that we have a viewpoint of what normal changes are in EKGs in a pregnant woman, how does that impact or what kind of EKGs would you say, would you use to define such as AVNRT, or atrial tachycardia, or EKG diagnostic for AVRT?

Kamala Tamirisa:

Okay. So we'll start with the most commonest among the Supraventricular Tachycardia, is AV nodal reentrant tachycardia. The typical one has a short RP interval or the RSR prime in V1. Provided the patient does not have RSR prime, the prime is the retrograde P wave. So short RP tachycardia, very classic finding in V1.

I think before the podcast we all looked at the EKG and that's what looked like a typical AV nodal reentrant tachycardia, but that's one diagnostic.

And then if we have a long RP tachycardia where the P wave is sitting beyond 50 milliseconds, 80 milliseconds, it's a long RP, then it opens to the differential of AVRT. It's like Dr. Volgman mentioned, accessory pathway mediated tachycardia or atypical AV nodal reentrant tachycardia, and atrial tachycardia also falls in that differential. Obviously, atrial tachycardia is less commoner in general amongst all the SVTs. So pregnant women, we see a short RP tachycardia, it's an AV nodal reentrant tachycardia.

Second one, long RP, the differential is wide open. When they're in sinus rhythm, the key take-home point is always go back to see if the patient was in sinus rhythm post-treatment or even pre-treatment from the previous EKGs. If there is evidence of a Delta wave suggestive of a pre-excitation, then that points to most likely mechanism being AVRT in that given patient with SVT.

Cicely Ann Dye:

So Dr. Volgman, can you talk to us about the acute treatment in SVT?

Annabelle Santos Volgman:

Thank you, Dr. Dye. This is a very interesting case. In pregnancy, you have to make sure that it's not sinus tachycardia that you're treating, but if you have determined that this is a narrow QRS tachycardia that is going very fast without hemodynamic compromise, because if there is hemodynamic compromise, you have to think about DC cardioversion. But if you do have the opportunity to treat the patient with medications, the first line of treatment is IV adenosine. You can use 6 milligrams, 12 or 18 milligrams to convert the patient. It does not harm the maternal or the fetus. So it is a safe drug to use in pregnancy. This is first line of treatment. If that does not work, you can always also use a beta blocker and then proceed to DC cardioversion if necessary, which Dr. Tamirisa will talk about. Thank you.

Kamala Tamirisa:

Thank you so much. We'll just talk about cardioversion, the role of cardioversion. Anytime if there is a pregnant woman with unstable SVT, which is sustained hemodynamically... Recently I had a patient who was at 28 weeks' gestation and came in with SVT at a rate of 290 beats a minute with a systolic pressure of 60. And she didn't respond to adenosine. She didn't respond to two doses of adenosine. Beta blockers obviously could not be given because mom was hypotensive. So in that case, acute cardioversion is warranted just like a non-pregnant woman. No reason to withhold cardioversion. The energy that can be used safely is 50 to 400 joules, as much needed, without fetal adverse rates. And the success rate during pregnancy, acute termination, is just like a non-pregnant woman, more than 90%. So it's a safe maneuver.

A couple of just take-home points with regards to cardioversion. Cardioversion does not compromise fetal blood flow. There's some reports of uterine contraction. Usually I try to educate myself and my team saying if she complains of some contractions post-cardioversion, it's okay. Just a lot of hydration, go ahead and feed her. Reassure the patient. For the most part, they do fine.

While cardioversion is very safe, it's prudent to do it in a place where there's fetal monitoring if time allows. Obviously, if time allows, fetal monitoring and emergency C-section and our MFM and high-risk OB are just at least notified. And a couple of things. Placing the patch placements, Cicely and Annabelle, that's important, right? Where do you put the patches for cardioversion when you're dealing with a patient with SVT? We are not trying to shock a VT patient, so the patch placement is anterior and the posterior unlike the anterior and the lateral positions. So that's important. And the key point is the gravid uterus needs to be avoided. Otherwise, all the energy is not delivered to the maternal heart. Amniotic fluid is a good conductor, so it's very important to keep the patches away from the gravid uterus and have fetal monitoring during that time.

Cicely Ann Dye:

Thank you, ladies. That was a great discussion. I think when a pregnant woman comes into an emergency room or comes in the clinic and are SVT, not only is it scary for the patient and the family, but also sometimes it can be scary for the provider, not knowing what you can do, what you can treat, and what is safe. So we know that vagal maneuvers are safe in pregnancy, adenosine, and also the use of IV beta blockers. And if necessary, you can go on to cardioversion.

Kamala, would you be able to discuss a little bit with us about ablation and whether they can or cannot occur during pregnancy?

Kamala Tamirisa:

Absolutely. So ablation, usually it's better to keep it as the last resort and keep it to be safely done after the delivery. So that's one statement I will say. Very important, unless the center is highly equipped with MFM, fetal monitoring, all the support system, and the indication for ablation during pregnancy needs to be incessant where the patient has failed all the medications and a hemodynamic compromise.

And have I done ablation during pregnancy? I have, but they were very incessant. One was incessant VT, other was incessant accessory pathway mediated tachycardia. It was a left lateral pathway and didn't respond to anything we did. So yes.

So going to cardiac ablation during pregnancy, the beautiful thing about EP is, as we all know, we have evolved from using radiation to not needing as much radiation for our ablation procedures. So intracardiac echo utilization and electro anatomic mapping systems is important.

There's not much data that is pretty consistent about using the gonadal or the abdominal radiation pad. Not using it is important because of the scatter that gets under if the pad is not placed in the right location. And then minimizing, reducing the fluoroscopy, everything, collimation, no [inaudible 00:20:10], low frame rates, using as low fluoro as possible. As far as the fetus goes, fetal monitoring is important during the ablation, keeping the cases very short.

And then the third thing is the lateral displacement of the uterus, especially if the pregnancy is beyond 20 weeks is important. And once the fetus is at the stage of viability and beyond, which is 24 weeks or more, very important to have emergency C-section team available, if we are taking to the lab, in case there's a complication with the procedure. Something we need to be ready and be thinking of all those.

So bottom line is, yes, they can be safely done, but it's better to wait until the delivery and the indication should, like we all discussed, be incessant and they have failed all the other medications.

And I always look to my mentor. Annabelle, anything you want to add to that?

Annabelle Santos Volgman:

Thank you. I look up to you, Dr. Tamirisa. In terms of catheter ablation, I agree that it should be used as a last resort, but in case of emergencies, it is definitely advisable to use it because we're using very little fluoro and really, the harm would be much worse if the patient continues to have recurrent arrhythmias that can't be terminated by medication. So I would not hesitate to use a catheter ablation in extreme circumstances. Thank you.

Cicely Ann Dye:

Thank you. So going back to our patient, ultimately she was prescribed metoprolol, which helped out with some of her symptoms and stopped the recurrent visits to the emergency room. She was able to deliver a happy and healthy baby boy, and about three months after pregnancy, she did undergo an EP study where she was found to have AVNRT and she had a successful slow pathway of modification without any recurrences.

Thank you for sharing your experiences with us today. We can review some of our takeaways today. So basically that arrhythmias do happen in pregnancy, but when they do, we diagnose them typically the same way, but you do need to take into account changes that are associated with pregnancy when reading the EKG, whether that be QT or whether that be left axis deviation. After you diagnose the patient, you are able to acutely treat them with vagal maneuvers, adenosine, or beta blockers. If needed, if there's hemodynamic compromise, you can also consider a cardioversion. And if the SVT is incessant and you're not able to control it in another way, an ablation is an option.

Dr. Volgman, Dr. Tamirisa, do you guys have any other takeaways?

Kamala Tamirisa:

Could I just say one thing to our listeners? Please do not withhold any treatment if the mother needs it. It's for her survival, including amiodarone if it's incessant SVT, hemodynamic compromise. Do not withhold treatment, and that's very important. I just wanted to make that point.

Cicely Ann Dye:

And I agree because the most important thing to have a happy, healthy baby is to have a happy, healthy, and living mother. So that's number one what's most important.

So thank you all for your time. This podcast is supported by Milestone Pharmaceuticals Incorporated. The views and opinions in this activity are those of the speakers or reflect the synthesis of science. Content should not be considered as official policy of the American Heart Association.

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