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What Echo Aspects are Essential to PH Diagnosis?

Announcer:
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Dr. Krasuski:
Hello, I'm Dr. Richard Krasuski from Duke University Medical Center. Today we're going to talk about the Echo Aspects that are Essential to Pulmonary Hypertension Diagnosis.

Now, the latest ESC/ERS guidelines came out in the latter part of 2022. And they came up with a beautiful algorithmic chart of how to make the diagnosis of pulmonary hypertension. Again, we typically start by looking at the peak tricuspid regurgitant velocity. If that is less than or equal to 2.8, that is going to be placed within the low probability. So we're going to look at additional echo signs, which will we will go over in a minute. If it's between 2.9 and 3.4, they fall in the intermediate category. And if it's greater than 3.4, they're already at high risk. The second step is ideally to identify what those higher echo criteria are, PH signs. So let's go over what those are.

So first of all, for the right ventricle, there are going to be three categories; they're going to be the ventricles, the atria and the pulmonary arteries. And you have to have 2 out of 3 of these categories to have this be an abnormality. So first of all the ventricles, we look at the right ventricular over left ventricular basal diameter, area - or area ratio, and it's going to be greater than 1.0. So in this case, you can see a measurement made at the base on the right ventricle and the left ventricle, and clearly this is greater than 1.0.

Secondly, we're going to look at flattening of the intraventricular septum. Normally, the left ventricle looks like an O throughout systole and diastole. But when there is right ventricular volume overload, typically you're going to see a D'ing of that septum during diastole. If there's volume and pressure overload, which are typically as in pulmonary hypertension, you're going to see a D shape either, you know, starting with diastole, but also continuing through systole, which you can see in the echo that's provided.

And then we move on to the TAPSE over the systolic pulmonary artery pressure ratio. TAPSE is the tissue angular systolic plane excursion. Remember, the right ventricle is more of a piston type of contractility pattern, it goes up and down. So we measure that up and down motion, and we make this measurement. And if it's less than 18 millimeters, that is considered to be abnormal. When we include the systolic PA pressure ratio, we get a nice measure of RV to PA coupling. And if we get a ratio that is less than 0.55, that is indicative that pulmonary hypertension may be present.

Moving on to the second category of the pulmonary artery, we can first look at the right ventricular outflow tract acceleration time. Remember, in pulmonary hypertension, the acceleration is increased. We look at the tracing and we look specifically at when the velocity starts to go up. That's our starting point. And then we measure it to the peak. And in pulmonary hypertension, that acceleration time is going to be less than 105 milliseconds. The other thing we can look for is the presence of a midsystolic notch. Remember, that's a reflected tracing. In pulmonary hypertension, we're going to see notching, which we typically should not see under normal conditions.

Secondly, we can look at the early diastolic pulmonary regurgitation velocity. This allows us to estimate the mean pulmonary artery pressure. If this is greater than 2.2 meters per second, it's very suggestive that pulmonary hypertension is present. We can also look in

the RV outflow tract view at the PA diameter and compare it to the aortic diameter. And you see if the PA diameter is greater than the aortic diameter, that is indicative of pulmonary hypertension, or if the PA diameter is greater than 25 millimeters.

The final category is the right atrium/inferior vena cava. In this case, we're looking specifically at the inferior vena cava and its size and how much it collapses with a breath. Normally, that diameter should be less than 2.1 centimeters, and it should collapse at least 50%. If that's the case, then the RA pressure is low that we're adding, and you see that as those categories go up, the right atrial pressure becomes higher. So if that's a high right atrial pressure, again, it's indicative that there could be a process going on. Finally, we can look at the right atrial size. If that's greater than 18 centimeters squared like it is in this particular patient, that is, again suggestive of pulmonary hypertension.

And then beyond that, as I mentioned, we look at risk factors. And we add that to the equation and you move up categories and you can see if you become a high probability, that's clearly an indication to move to either additional imaging like MRI or CT, or possibly even an invasive tests like a cardiac catheterization to make the diagnosis. If you fall into the lower-risk categories, specifically a very low-risk category, that's somebody that you ought to be thinking about different diagnoses. On the other hand, if you fall in the middle category, you probably want to follow that patient up with another echo in somewhere between 3 months and 1 year.

So in summary, what we've talked about today is the new criteria that have been proposed by the ESC and the ERS for diagnosis. Remember, you start with a TR velocity, you look at 2 out of the 3 categories, specifically looking at right atrium IVC, looking at RV, looking at PA and if that's met, you move up in those characteristics. And then once you reach that high-risk group, that's the patients that ideally you want to be performing heart catheterization to confirm the diagnosis.

And I thank you for your attention.

Announcer:
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