Transcript Details

This is a transcript of a continuing medical education (CME) activity. Additional media formats for the activity and full activity details (including sponsor and supporter, disclosures, and instructions for claiming credit) are available by visiting:
https://reachmd.com/programs/cme/essential-ph-imaging-techniques-and-views/14716/

Time needed to complete: 1h 55m

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

Essential PH Imaging Techniques and Views

Announcer:
Welcome to CME on ReachMD. This episode is part of our MinuteCME curriculum.

Prior to beginning the activity, please be sure to review the faculty and commercial support disclosure statements as well as the learning objectives.

Dr. Haddad:
Hello, my name is Francois Haddad. I'm a cardiologist at Stanford University. I'm very happy to be presenting today on essential imaging techniques and views for pulmonary hypertension.

In 2022, ERS/ESC, summarized the key echocardiographic views important for pulmonary hypertension. These include the parasternal views, the apical views, and the subcostal views. These three most important views can be combined together to derive important metric for pulmonary hypertension.

First, in the parasternal view, the right ventricular outflow tract signals by pulse Doppler carries significant amount of information in pulmonary vascular disease. One can analyze the presence of notching and also can measure right ventricular outflow tract acceleration time. On the continuous Doppler, the pulmonary regurgitation signal can be assessed, and the maximal pulmonary regurgitation velocity can be used to estimate mean pulmonary arterial pressure.

In the parasternal short-axis views focused on the midpapillary left ventricle, one can analyze septal curvature and measure the index of left ventricular eccentricity index, a very useful metric of pressure ventricular interdependence, volumetric interdependence, and electric interdependence between the ventricles.

The apical four-chamber view is central in the assessment of several metrics in pulmonary hypertension. First, one can calculate right ventricular and diastolic and end systolic area to derive the metric of right ventricular fractional area change. The usual threshold used in the literature is 35%.

Similarly, using M-Mode imaging, one can measure the tricuspid annular plane systolic excursion. This has been a very simple and reproducible metric found in pulmonary hypertension. The thresholds by the ERS/ESC recommended was 18 millimeters of mercury, and the one by the American Society of Echocardiography was slightly lower at 17 millimeters of mercury.

The parallel concept to the tricuspid annular plane systolic excursion is the presence of systolic velocity by tissue Doppler. The peak systolic velocity threshold of 9.5, have often been used to discriminate dysfunction in the right ventricle. An emerging metric of right heart function and size is the right atrial size and the right atrial emptying fraction or strain that have also emerged recently as being very prognostic in the disease, and refocuses some of the attention to the right atrium.

One important aspect and central aspect with pulmonary hypertension is always the assessment of tricuspid regurgitation maximal velocity. This can be made in the apical four-chamber view, by finding the best intonation and angle for the tricuspid regurgitation velocity. Parasternal views or subcostal views can also be useful for this purpose.

Finally, in the subcostal views, it's very important to assess the inferior vena cava size and collapse index for the assessment of right

atrial pressure.

One cannot complete the summary of the key measures of pulmonary hypertension by mentioning the presence of pericardial effusion, which has been shown to be a predictive marker in PH independent of clinical markers.

All these key features are very important to answer three important questions about pulmonary hypertension. The first one: How can we put these features together to derive a probability for the diagnosis of PH? The ESC of 2022 recommends that combining the central role of hemodynamic measures and combining tricuspid regurgitation velocities with supporting signs can be particularly powerful to derive a probability of PH. As you could see in these slides, one can combine the degree of elevation of the pulmonary regurgitation velocity with the presence of supporting signs to really inform the probability of disease.

The second important question to mention is: How can the metric in pulmonary hypertension be used to establish or aid in the prognosis in pulmonary arterial hypertension? As summarized by this beautiful slide by Anna Hemnes at the Sixth World Symposium of Pulmonary Hypertension, there's been many studies in the field, some of them using a particular metric while other being more comprehensive. To simplify this field, one can remember that the prognosis in pulmonary hypertension is closely related to right heart metrics. These can be circulating biomarker like NT-proBNP, or can also be imaging-based measure, such as tricuspid, annular systolic excursion, right ventricle longitudinal strain, or right ventricle and systolic volume, or right atrial strain as an emerging measure. MRI or 3D echocardiographic studies favor the right ventricle and systolic volume in most recent studies. And as mentioned previously, pericardial effusion carries an important prognostic role in pulmonary hypertension.

Finally, the third question that's important is: How can these imaging features help us distinguish WHO Group 1 from WHO Group 2 pulmonary hypertension? Or how can they help us distinguish precapillary from postcapillary pulmonary hypertension? In this beautiful study done by Opotowsky of Forfia's group, they really focused on four simple key features to develop the score for differentiating the two conditions. These include the measure of LA size, measuring E/e prime velocities, the presence of midsystolic notching, or a systolic notching on the primary flow signal, or an acceleration time that is reduced. By combining these features, one can develop a probability of presence of WHO Group 1 or 2 pulmonary hypertension.

I hope that this presentation was useful. And remember that combining all these metrics will help us answer the three essential questions. Mainly, what is the probability of pulmonary hypertension? The second question: How can I use this metric to develop a risk score for pulmonary hypertension? And what are the threshold of this function to use? And finally, the third question is: How can we use these features to differentiate WHO Group 1 from Group 2 pulmonary hypertension?

I want to thank you for your attention. And I hope this presentation was useful.

Announcer:
You have been listening to CME on ReachMD. This activity is jointly provided by Global Learning Collaborative (GLC) and TotalCME, Inc. and is part of our MinuteCME curriculum.

To receive your free CME credit, or to download this activity, go to ReachMD.com/CME. Thank you for listening.