



Image Article

Methamphetamine-Induced Isolated Severe Pulmonary Hypertension and Cor Pulmonale: Diagnostic Value of Echocardiography for this Uncommon Condition

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Clinical Presentation

A 39-year-old female with a history of methamphetamine abuse presented with progressive dyspnea on exertion, hypoxia, tachypnea, tachycardia, mild hypertension, marked jugular vein distention, distant heart sounds, bibasilar rales, and lower extremity edema. Methamphetamine was detected in her urine. Chest CT was negative for pulmonary emboli. The patient was admitted with a new diagnosis of right heart failure.

Imaging Findings

Transthoracic echocardiography (TTE) showed severe right ventricular (RV) and right atrial (RA) dilatation, abnormal septal motion of RV pressure overload, plethoric inferior vena cava (IVC), and moderate pericardial effusion (Figures A-C), as well as moderate tricuspid regurgitation (TR) with a peak velocity of 4.2

m/sec and moderate pulmonary regurgitation with early and late peak velocities of 2.8 m/s and 2.2 m/s, respectively. Applying the Bernoulli equation ($4V^2 + RA$ pressure of 15-20 mmHg) to these 3 peak velocities, the estimated pulmonary artery (PA) systolic, mean, and diastolic pressures were 85–90, 45–50, and 35–40 mmHg, respectively. Using an LV outflow tract diameter of 2.2 cm, an LV outflow tract velocity time integral of 10.92 cm, and a heart rate of 96 beats per minute, the cardiac output was 4.2 l/min. Using the formula pulmonary vascular resistance (PVR) = mean PA pressure – RA pressure/cardiac output, the PVR was determined to be 7.2 Wood units. The patient underwent right heart catheterization which yielded PA systolic, mean, and diastolic pressures of 85, 54, and 36 mmHg, respectively, and cardiac output and PVR values of 4.5 l/min and 12.1 Wood units, respectively. On the basis of these findings, a diagnosis of Group 1 pulmonary hypertension was confirmed.

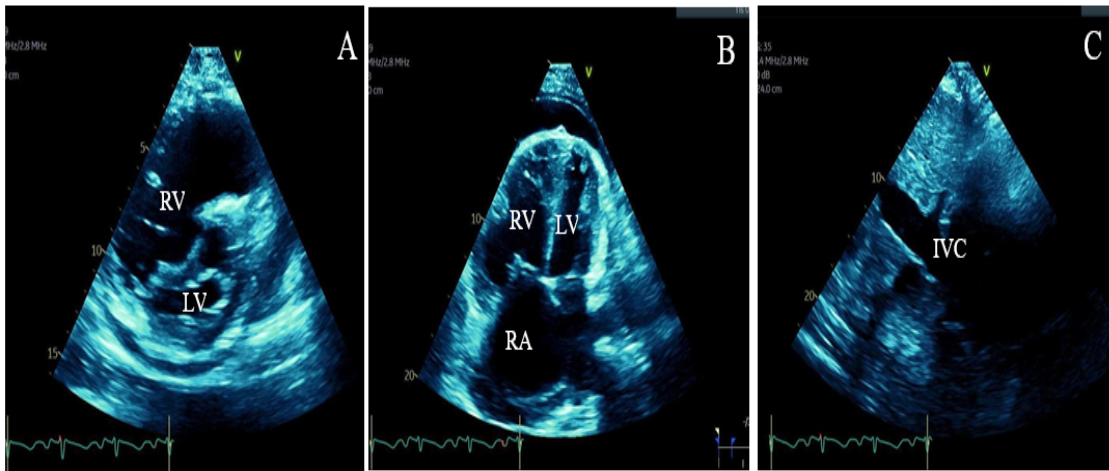


Figure 1: A. Dilated RV, LV is a small cavity, B. Dilated RV and Dilated RA, C. Dilated IVC.

Role of Imaging in Patient Care

TTE was critical in the diagnosis, stratification, and in part classification of Group 1 severe pulmonary hypertension with severe cor pulmonale. TTE was critical in the diagnosis of right heart enlargement and elevated pressures due to severe pulmonary hypertension. Furthermore, pulmonary and right heart pressures assessed noninvasively by TTE closely correlated with those measured invasively by right heart catheterization.

Summary/Discussion Points

Methamphetamine use has been associated predominantly with left heart disease and rarely with isolated pulmonary hypertension. As illustrated in the present case, TTE plays an important role in the diagnosis, stratification, and classification of

isolated severe Group 1 pulmonary hypertension along with right heart enlargement associated with methamphetamine abuse [1-3].

References

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