

P1505

Echocardiographic assessment of different pulmonary hypertension groups

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Introduction: Noninvasive echocardiography evaluation of the right ventricle (RV) has been shown to have prognostic value in patients with pulmonary hypertension (PH). Different etiology groups might have different echocardiographic phenotypes. In this study, we aimed to study echocardiographic characterization of the different PH groups and its ability to predict pulmonary vascular disease severity.

Methods: We collected echocardiographic and right heart catheterization (RHC) data from 97 (75% female, age 65 ± 15 years) consecutive patients referred to an expert tertiary care referral PH centre from 12/2016 to 11/2018. Echocardiographic analysis was performed using Echo-Pac software from GE Healthcare®. Group 3 and 5 were not included in the group comparison analysis due to few patients included.

Results: Group 2 PH was the most frequent etiology of PH (35), followed by group 1 (26), group 4 (18), group 5 (3) and group 3 (2). The echocardiographic evaluation of this population as a whole showed borderline parameters of RV dysfunction (tricuspid annular plane systolic excursion (TAPSE) 18 ± 4 mm, fractional area change (FAC) $33 \pm 10\%$ and S' tricuspid wave 10 ± 3 cm/sec). Mean RV global strain was -15 ± 5 and RV free wall strain was -17 ± 7 .

PH group 1 had a significantly lower FAC ($26 \pm 4\%$, $p = 0.0025$), higher eccentricity index (IE) (1.5 ± 0.1 , $p = 0.01$), and more frequently RV outflow tract (RVOT) notching than other groups (62% , $p = 0.012$). Group 4 presented an intermedium echocardiographic phenotype between group 1 and 2, and showed more abnormal strain values than the other groups. Group 2 had fewer patients in sinus rhythm (atrial fibrillation in 34% of patients, $p = 0.02$), presented a thicker interventricular septum (11.3 ± 1.8 , $p = 0.014$), a higher FAC ($35 \pm 3\%$, $p = 0.0025$), higher E mitral wave velocity (72 ± 6 cm/s, $p < 0.001$) and E/E' ratio (12.7 ± 10.2 , $p = 0.006$), and larger left (45 ± 3 cm³/m³, $p < 0.01$) and right atria (25 ± 2 cm², $p = 0.03$).

PH groups 1 and 4 had higher Pulmonary Vascular Resistance (PVR) and Pulmonary Mean Arterial Pressure (PMAP) values than group 2, which significantly correlated with echocardiographic RV function parameters as TAPSE, FAC, RV global strain and IE. In PH group 2, eccentricity index was the only predictor of PVR ($\beta = 4.1$, $p = 0.018$). In this population, a left atria volume < 32.7 cm³/m² (OR 4.25, CI 1.71 - 10.55) and a E/e' ratio < 12 (OR 4.72, CI 2.05 - 10.87) predicted PECP < 15 mmHg. RV global strain > -17.1 predicted PVR > 3 wood (OR 3.46, CI 1.50 - 8.02) and PMAP > 20 mmHg (OR 4.92, CI 1.67 - 14.51). TAPSE < 18 mm predicted PVR > 3 wood (OR 7.41, CI 2.99 - 18.36, AUC 0.72).

Conclusion: Different PH groups present mild echocardiographic differences between them. PH group 1 presented with more echocardiographic signs of RV dysfunction, and PH group 2 had higher FAC, E/E' and larger right and left atria. RV function parameters predicted PVR in PH groups 1 and 4, and EI was the only predictor of PVR in PH group 2.

Abstract P1505 Figure.

