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Title: Speckle tracking longitudinal strain imaging to assess right ventricular dyssynchrony in pulmonary hypertension patients

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Body: Prognosis in PH patients is related to right ventricular (RV) failure. We aimed to explore whether chronic RV pressure overload could induce RV dyssynchrony diagnosed using echocardiographic speckle tracking strain (STS). Methods Sixty-eight subjects were prospectively studied: 54 patients with PH (mean pulmonary artery pressure 41(10) mmHg) and 14 controls. Within one hour prior to RHC, patients underwent a 2D echocardiographic Doppler and STS analysis. Patients with PH confirmed on RHC and controls with normal RHC were included. RV echo parameters, global and regional RV contractility were measured. Dyssynchrony was defined as the maximum time difference between earliest and latest peak segmental strain among 6 RV segments. Results The maximum time difference for peak strain among segments was minimal in the control group (70 (30) ms). Dyssynchrony was increased in the PH group (187 (151) ms, p=0.0003). Global RV peak strain was decreased in PH patients (-15(7) vs -18(8)%, p=0.01). They had early RV septal contraction with time to peak strain for basal septum (487 (122) vs 530 (72) ms, p=0.03), mid septum (449 (83) vs 527(72) ms, p=0.002) and apical septum (466 (124) vs 545 (54) ms, p=0.01) occurring earlier. Only basal septum peak strain (-15 (6) vs -20 (5) %, p=0.02) and mid peak strain (-16 (6) vs -19 (5) %, p=0.02) were depressed. Eighty four percent of patients with a normal TAPSE had RV dyssynchrony. Conclusion RV dyssynchrony quantified by echocardiographic STS is an early measure of RV dysfunction in PH patients. Global RV dysfunction and abnormal regional contractility were detected using speckle tracking strain before a decrease in TAPSE.