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Echo Predictors of Pulmonary Embolism in Patients with Dyspnea Referred for Computerized Tomographic Pulmonary Angiography

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Background:
Trans-thoracic echocardiography (TTE) is frequently ordered in patients with suspected pulmonary embolism (PE). The aim of our study was to determine the predictive ability of multiple echo RV parameters to diagnose PE among patients referred for CT to evaluate dyspnea.

Methods:
Prospectively planned analysis of echo data in patients presenting to the emergency department with dyspnea and suspected PE, as part of a "dyspnea triage protocol". All patients underwent pulmonary angiography CT and echo within 24 hours. Physicians and sonographers performing the echo were blinded to the results of CT.

Results:
172 patients (age 65.8±19; 40% male; 24% PE) were included in the study. The patients with PE had higher prevalence of "D-sign" (19% vs. 4%), "McConnel sign" (29% vs. 4%), "60/60 sign" (24% vs. 8%), smaller left atrial diameter (3.9±0.8 vs. 4.7±4.8cm), shorter pulmonary acceleration time (PAT; 85.4±30.6 vs. 98.0±26.7msec), ratio of PAT to pulmonary ejection time (PAT/ET; 0.29±0.07 vs. 0.34±0.1), and less respiratory changes in PAT (6.9±6.3 vs. 12.2±11.1msec), $P<0.05$ for all. Nominal logistic regression analysis showed that the only echocardiographic parameters associated with PE were PAT (sensitivity 50.0%, specificity 79.8%), PAT/ET (sensitivity 89.7%, specificity 32.0%), respiratory change in PAT (sensitivity 80.0%, specificity 32.1%), "D-sign" (sensitivity 19.5%, specificity 96.0%), "McConnel sign" (sensitivity 29.3%, specificity 96%), and "60/60 sign" (sensitivity 23.7%, specificity 91.5%).Systolic pulmonary pressure and all other parameters of RV function did not differ between those with and without PE. Receiver operator curves for all parameters were <0.7.

Conclusions:
"McConnel sign" and PAT/ET are the most specific and sensitive, respectively for diagnosis of PE. PAT and its change during respiration are the most accurate (ROC=0.65; $p<0.001$ for both). Although presence of these findings should prompt further diagnostic testing for PE, echocardiography should not be relied upon to exclude or diagnose PE.