

Echocardiographic Parameters Associated with Long-Term Mortality in Patients with Dyspnea With and Without Pulmonary Embolism

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Background:

Trans-thoracic echocardiography (TTE) is frequently ordered in patients with dyspnea. We determined the association of multiple echo RV parameters with long term survival among patients referred for CT to evaluate dyspnea, with and without pulmonary emboli (PE).

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. Association with survival and differences between patients with and without PE were tested using Cox Hazard models with interaction terms and subgroup analyses.

Results:

172 patients (age 65.8±19; 40% male; 24% PE) were included in the study. Age Hazard ratio (HR) 1.06, LA volume HR 1.09, RA area HR 1.05, RV end diastolic area HR 1.05, RV end systolic area HR 1.07, RV fractional area change HR 0.96, LV end diastolic volume HR 0.86, RV/LV area ratio HR 2.8, stroke volume HR 0.96, systolic pulmonary pressure HR 1.05, pulmonary ejection time HR 0.88, "Tei Index" HR 17.1, sum of isovolumic contraction and relaxation time (IVC+IVR) HR 1.16, pulmonary acceleration time HR 0.79, "D-sign" HR 3.8 were all significantly associated with mortality ($p < 0.01$ for all), but visually estimated RV function was not. In sub-group analysis, the only independent parameters associated with survival in patients with PE were age, increased "Tei Index", increased IVC+IVR, low stroke volume, and short pulmonary artery acceleration time. There were significant interactions between systolic pulmonary pressure, LA volume and PE. In PE lower pulmonary pressure and higher LA volume were associated with increased mortality, opposite to the non-PE patients.

Conclusions:

Visual estimation of RV function is insufficient and comprehensive assessment of Doppler and semi-quantitative parameters are necessary. The best predictors of long term survival are prolonged pulmonary acceleration time and short IVC+IVR.