

The additive prognostic value of B-lines and heart rate reserve during “kindergarten” stress echocardiography

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Background: B-lines by lung ultrasound (LUS) were added to stress echo (SE) as a direct sign of pulmonary congestion useful to establish an objective link between dyspnoea symptoms and acute heart failure. They are feasible with “kindergarten” training of few hours and pocket size instruments.

Aim: To assess the prognostic value of “kindergarten SE” only based on B-lines and imaging-independent heart rate reserve (HRR).

Methods: We enrolled 2,149 patients (age 63±16 yrs, 831 women, 39%) with known or suspected coronary artery disease referred for exercise (n=1,015), dipyridamole (n=1,039), adenosine (n=16) or dobutamine (n=79) SE. By LUS, we adopted the 4-site simplified scan, each site scored from 0=normal A-lines, to 10=coalescing B-lines. HRR was assessed as peak/rest ratio of heart rate. All patients were followed-up.

Results: Interpretable HRR and LUS data were obtained in all patients (feasibility=100%). Abnormal B-lines (≥2) at peak stress were present in

756 patients (35%). Abnormal HRR (≤1.80 for exercise and dobutamine and ≤1.22 for vasodilator) was found in 986 patients (46%), both positivity in 388 patients (18%). During a median follow-up time of 15 months, 137 spontaneous events occurred in 120 patients: 38 deaths, 28 myocardial infarctions, 60 acute heart failures, 11 strokes. B-lines ≥2 and/or reduced HRR were independently associated with adverse outcome (see figure). At multivariable analysis, a three-fold increased risk of death was observed when both B-lines and HRR were abnormal (Hazard ratio: 3.097, 95% Confidence Intervals 1.095–8.754, p=0.03).

Conclusions: A super-simplified stress test (“SE without SE”) with simple heart rate assessment by EKG and LUS for B-lines evaluates key variables such as chronotropic incompetence (due to reduced sympathetic reserve) and pulmonary congestion (due to backward acute heart failure) and allows an accurate prediction of outcome.

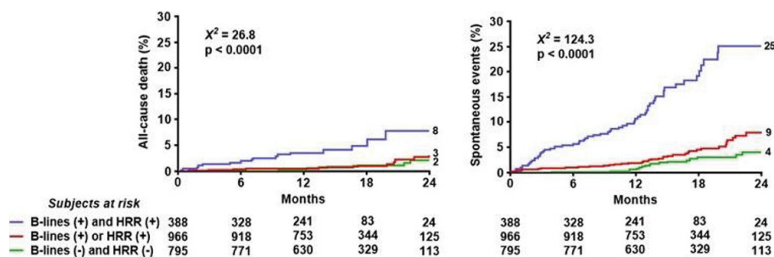


Figure 1