Right ventricular dysfunction after therapy titration, but not at the time of index hospitalization, predicts prognosis in patients with new-onset acute heart failure

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Introduction and aims: The prognostic implications of right ventricular dysfunction (RVD) in patients with left ventricular (LV) disease has gained more attention over the last years. However, the role of RV function in new-onset acute heart failure (NoAHF) has only recently come into focus. The description of RVD is often confined to its longitudinal function. In the present study of patients with NoAHF, we aimed at (I) comparing the prognostic ability of RV longitudinal function with a novel echocardiographic RVD score and (II) to test the hypothesis that RVD conveys more prognostic information if it persists after titration of heart failure therapy.

Methods: Patients aged 18 to 70 years, admitted between 2015 and 2018 to a tertiary center with NoAHF were retrospectively included, provided that they did not have previous heart failure diagnosis or therapy and that complete echocardiograms were available at the time of index hospital admission and after titration of heart failure therapy. The RVD score allocates one point each for tricuspid annular plane systolic excursion (TAPSE) $<$ 17 mm (longitudinal dysfunction), right ventricular diastolic area index $>$ 11.5 cm²/m² (women) or $>$ 12.6 cm²/m² (men) (RV dilatation), $\geq$ moderate tricuspid regurgitation (RV deformation) and vena cava inferior collapsibility $<$ 50% (increased right atrial pressure). An RVD score $\geq$ 2 was defined as significant RVD. Patients were followed for the composite endpoint of death from all causes, heart transplantation or implantation of LV assist device until September 2022.

Results: Two-hundred and ten patients were followed for a median of 60 months. At index hospitalization, LV ejection fraction (LVEF) was 28 $\pm$ 10%, TAPSE was 16 $\pm$ 4 mm and 36% of the patients had a RVD score $\geq$ 2. Eighty-eight percent of the patients had LVEF $<$ 40%. At the end of the follow-up, 53 (25%) patients met the endpoint. At index hospitalization, there were no significant differences in any echocardiographic parameters between patients meeting and not meeting the endpoint. After titration of heart failure therapy, there were significant differences in LVEF (33% vs 46%, P < 0.001), TAPSE (16 vs 19 mm, P = 0.001) and the proportion of patients with RVD score $\geq$ 2 (4% vs 36%, P < 0.001). Figure 1 and 2 show Kaplan-Meier curves for survival free of composite endpoint in patients with and without RVD despite therapy titration, defined as TAPSE $<$ 17 mm or as RVD score $\geq$ 2. The unadjusted hazard ratio (95% CI) for TAPSE was 2.5 (1.5-4.4) and for RVD score 7.9 (4.4-14.0).

Conclusions: At index hospitalization, neither LVEF nor RV function can predict the prognosis in patients with NoAHF. However, the persistence or onset of RV dysfunction after titration of heart failure therapy does. A multiparametric echocardiographic RVD score might provide improved prognostic stratification when compared to TAPSE.
Kaplan-Meier, RVDS <2 vs ≥2