

## Prevalence, severity and clinical correlates of left ventricular diastolic dysfunction in patients hospitalized with acute cardiac decompensation – a sub-study from the Acute Heart Failure

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**Background:** To date, there are few prospective studies which characterize left ventricular diastolic dysfunction (LVDD) in patients with acute heart failure (AHF) using contemporary echo- and Doppler-techniques and take heart failure (HF) phenotype into account. Furthermore, prevalence and clinical correlates of different degrees of LVDD are unknown.

**Purpose:** To determine prevalence and echo characteristics of LVDD and identify clinical and biomarker correlates in patients hospitalized for AHF with either preserved (HFpEF, LVEF  $\geq 50\%$ ) or reduced (HFrEF, LVEF  $< 50\%$ ) LV systolic function.

**Methods:** The AHF Registry Würzburg enrolls consecutive patients hospitalized for AHF. For the current analysis, patients with complete high-quality echo- and Doppler studies performed during the index hospitalization allowing for full quantitative analysis were eligible. Left ventricular ejection fraction (LVEF) was determined using Simpson's biplane method. LVDD was graded according to 2016 ESC recommendations based on the E/A-ratio and markers of left ventricular (LV) filling pressure: E/E'-ratio, LA volume, and estimated systolic pulmonary artery pressure (sPAP, derived from peak tricuspid regurgitant flow velocity and estimated right atrial pressure). E/A-ratio  $< 0.8$  or E/A-ratio 0.8–2.0 without evidence of increased LV filling pressure was classified as LVDD<sup>o</sup>I, an E/A-ratio between 0.8–2.0 with evidence of elevated filling pressure as LVDD<sup>o</sup>II, and an E/A-ratio  $> 2.0$  as LVDD<sup>o</sup>III. LVDD prevalence rates were determined overall and in

patients with HFrEF and HFpEF, respectively. Furthermore, other echocardiographic, clinical, and biomarker characteristics were studied.

**Results:** Overall, 155 patients were eligible (37.4% female, mean age  $71.6 \pm 12.0$  years, LVEF  $45.7 \pm 17.8\%$ , 49.7% HFpEF, 50.3% HFrEF). Most patients (83.9%) had Doppler evidence of increased filling pressures, with either LVDD<sup>o</sup>II (48.4%, LVEF  $48.6 \pm 18.6\%$ ) or LVDD<sup>o</sup>III (35.5%, LVEF  $40.3 \pm 15.4\%$ ). Overall, HFrEF-patients had higher rates of LVDD<sup>o</sup>III (47.4 vs 23.4%,  $p=0.002$ ), while HFpEF-patients had higher rates of LVDD<sup>o</sup>II (58.4 vs 38.5%,  $p=0.013$ ) (Figure). LVDD<sup>o</sup>I was present in only 16.1% of all patients (HFpEF:  $n=14$ , HFrEF:  $n=11$ , LVEF  $48.9 \pm 15.4\%$ ). Compared to patients with LVDD<sup>o</sup>II-III, this subgroup had lower E/E'-ratio ( $11.7$  vs  $19.5$   $p<0.001$ ), sPAP ( $30.9 \pm 15.8$  vs  $44 \pm 12.5$  mmHg,  $p<0.001$ ) and LA volume index ( $36.4 \pm 17.67$  vs  $53.5 \pm 21.0$  ml/m<sup>2</sup>,  $p<0.001$ ). Furthermore, NT-proBNP-levels were lower (median [IQR] 2236 [1336; 5204] vs 4125 [2390; 4125] pg/ml,  $p=0.042$ ) and heart failure (HF) history shorter ( $56.0$  vs  $33.1\%$  HF known  $< 1$  year,  $p=0.029$ ).

**Conclusion:** Among patients hospitalized for AHF, the majority had significant LVDD, irrespective of LVEF. However, LVDD<sup>o</sup>II was more common in HFpEF, whereas HFrEF patients had more LVDD<sup>o</sup>III. Furthermore, the small subgroup with LVDD<sup>o</sup>I had less severe sPAP elevation, lower LA volume and NT-proBNP and a shorter HF history indicating a less advanced HF stage.

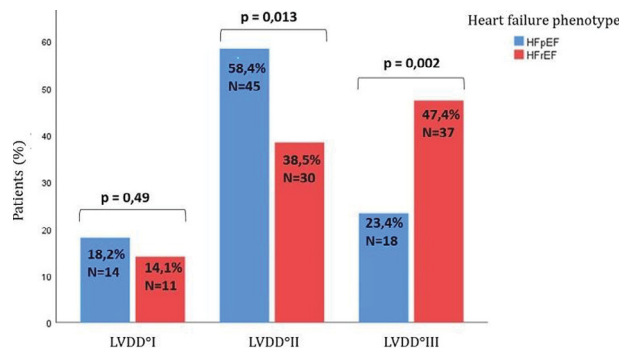


Figure: Rates of low-, intermediate- and high-grade left ventricular diastolic dysfunction (LVDD) in 78 HFpEF-patients (red) and 77 HFrEF-patients (blue) during hospitalization with AHF