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# Left atrial function in heart failure with preserved ejection fraction: backward and forward coupling and prognostic relevance

Schoenbauer R.<sup>1</sup>; Kammerlander AA.<sup>2</sup>; Duca F.<sup>2</sup>; Aschauer S.<sup>2</sup>; Binder C.<sup>2</sup>; Zotter-Tufaro C.<sup>2</sup>; Nitsche C.<sup>2</sup>; Fiedler L.<sup>1</sup>; Roithinger FX.<sup>1</sup>; Loewe C.<sup>3</sup>; Hengstenberg C.<sup>2</sup>; Bonderman D.<sup>2</sup>; Mascherbauer J.<sup>2</sup>

<sup>1</sup>Landeskrankenhaus Wiener Neustadt, Cardiology, Wiener Neustadt, Austria

<sup>2</sup>Medical University of Vienna, Cardiology, Vienna, Austria

<sup>3</sup>Medical University of Vienna, Cardiovascular and Interventional Radiology, Bioimaging and Image-Guided Therapy, Vienna, Austria

**Background:** Global left atrial (LA) size and function have been shown to be associated with adverse events in heart failure with preserved ejection fraction (HFpEF). The mechanism of coupling from left heart failure to pulmonary circulation is still controversially discussed.

**Purpose:** To study the most relevant prognostic determinant of LA size and function and its backward and forward interplay.

**Methods:** 188 HFpEF patients were prospectively enrolled and underwent baseline clinical and echocardiographic assessment, cardiac magnetic resonance imaging (CMR) and invasive hemodynamic assessment. Significant coronary artery disease was ruled out by coronary angiography. 92 patients were in atrial fibrillation (AF), 96 in sinus rhythm (SR). LA size and function were assessed by CMR including LA strain imaging by myocardial feature tracking (Figure 1A&B).

**Results:** After 31 (IQR 10-57) months 66 patients (22 SR and 44 AF patients) reached the combined endpoint defined as combination of hospitalization due to heart failure and cardiovascular death. In AF no atrial functional or volume parameter was correlated to outcome. In contrast in SR several phasic LA volume and functional parameters were associated with outcome. By cox regression analysis of SR patients, reduced total LA ejection fraction and conduit strain rate were still predictive for worse outcome ( $p = 0.031$  and  $<0.001$  respectively). After adjustment for known risk factors in HFpEF like six minute walking distance (6MWD), age, systolic pulmonary artery pressure (sPAP) and right ventricular ejection fraction as derived by CMR, only impaired LA conduit strainrate remained predictive for cardiovascular events (OR 0.97, 95% CI 0.95-0.99,  $p = 0.001$ ). In contrast to LA booster pump function LA conduit function parameters were significantly correlated to reduced 6MWD ( $p=0.39$ ,  $p < 0.001$ ; Figure 1C) and coupled backwards to pulmonary vasculature via significant correlation to sPAP and pulmonary vascular resistance (PVR) but without coupling to elevated left ventricular extracellular volume (MOLLI-ECV) and pulmonary artery wedge pressure (PCWP).

**Conclusions:** Total LA ejection fraction plays a key role in the prognosis of HFpEF. This effect seems to be mainly related to its LA conduit function but not to LA booster pump function. LA conduit function correlates to impaired 6MWD, sPAP and PVR.

Abstract 336 Figure. Strain imaging analysis

