Dissociation of LA volume and deformation is a hallmark of ATTR-CA

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Background: Transthyretin Cardiac amyloidosis (ATTR-CA) is associated with an infiltrative left atrial (LA) cardiomyopathy.

Purpose: We sought to identify unique characteristics of LA cardiomyopathy in CA compared to non-amyloid states of left ventricular hypertrophy (LVH).

Methods: In suspected patients, a diagnosis of ATTR-CA was made by a positive Tc-99m PYP in conjunction with negative serum/urine studies for a clonal plasma cell dyscrasia. Endomyocardial biopsy was performed when clinically indicated. All patients underwent complete transthoracic echocardiography (TTE) with speckle tracking strain imaging. Left ventricular (LV) strain, LA reservoir strain (LASr) and LA volume index (LAVI) were measured. LA stiffness index was estimated by the ratio (E/e')/LASr. ATTR-CA patients were compared to patient with non-CA LVH (interventricular septal thickness >1.2 cm). Atrial fibrillation (AF) during the TTE was noted. Logistic regression and Cox-regression analyses were performed to find the independent determinant of ATTR-CA and outcome predictors, respectively.

Results: We studied 98 patients with ATTR-CA (44 with AF) and 62 patients with non-CA LVH (35 with AF). ATTR-CA patients had a higher prevalence of relative apical sparing (RAS) (79% vs 20%, p<0.0001), reduced LASr (9.8±4.8% vs 14.0±7.2%; p<0.001) and high LA stiffness (2.5±0.2 vs 1.4±0.9; p<0.001) irrespective of AF. Surprisingly, LAVI of ATTR-CA patients was significantly lower than non-CA LVH patients (44 ±15 ml/m² vs 51±24 ml/m²; p=0.046). Consequently, LAVI correlated strongly with LASr in non-amyloid LVH group (r= -0.52, p<0.001) whereas no correlation was observed in ATTR-CA (p<0.05) (Figure 1). Patients with ATTR-CA had the lowest LASr and highest LA stiffness regardless of AF (Figure 2). Importantly, LASr determined ATTR-CA among all study subjects independently of RAS (p<0.001) and emerged as a predictor of composite endpoint including all-cause mortality, hospitalization from heart failure and stroke in ATTR-CA patients (p=0.037).

Conclusion: ATTR-CA is characterized by severely reduced LASr and increased LA stiffness, yet LA dilatation is relatively less severe when compared to other causes of LVH. LASr seems promising to make the differential diagnosis of ATTR-CA and is of prognostic importance.

Figure 1
Increased stiffness in ATTR-CA

LA Stiffness
(E/e')/LASr

Sinus rhythm  AF  Sinus rhythm  AF
Non Amyloidosis  LVH  ATTR-CA

*p<0.001

Figure 2