Association of left atrial myopathy and sarcomere mutation in patients with hypertrophic cardiomyopathy: insights into left atrial strain by MRI feature tracking

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Background: Left atrial (LA) mechanical dysfunction is associated with atrial fibrillation and stroke in patients with hypertrophic cardiomyopathy (HCM). The role of sarcomere mutation in LA mechanical dysfunction and the value of LA strain in differentiating mutation-positive patients remain unclear in patients with hypertrophic cardiomyopathy (HCM).

Methods: Consecutive HCM patients underwent HCM-related gene screening and cardiac magnetic resonance (CMR) at Fuwai Hospital from October 2011 to December 2013 were retrospectively enrolled. LA volume, ejection fraction, strain and strain rate in reservoir, conduit and booster-pump phases were investigated respectively. Independent sample t-test, Logistic regression and receiver operator curve analysis were performed for statistics.

Results: A total of 105 patients (75 Males, 47.8 ± 11.9 years old) were enrolled. 50 mutation-positive patients showed higher LA maximal volume index (59 ± 28 vs 44 ± 18, p = 0.001), lower LA reservoir (21 ± 8 vs 26 ± 7, p < 0.001) and booster-pump strain (12 ± 5 vs 17 ± 5, p < 0.001) but relatively preserved conduit strain (9 ± 4 vs 9 ± 4, p = 0.909) compared with mutation-negative patients. LA booster-pump strain rather than reservoir strain was associated with sarcomere mutation independent of LA volume, maximal wall thickness and late gadolinium enhancement (LGE) according to multivariate logistic regression. Furthermore, LA booster-pump strain alone (AUC 0.798 vs 0.709, p = 0.035) or combined with LGE (AUC 0.823 vs 0.709, p = 0.011) showed incremental value for differentiating mutation-positive patients added to Mayo II score.

Conclusions: In HCM, mutation-positive patients demonstrated significantly higher LA volume and more deteriorated LA reservoir and booster-pump function but relatively preserved conduit function compared with mutation-negative patients. LA booster-pump strain was independently associated with sarcomere mutation and showed incremental value for differentiating mutation-positive patients added to established models.