Abstract: P39

Cross-sectional analysis of 6-minute walk distance and diastolic function in a Hong Kong cohort of community-living older adults

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Background/Introduction
6-min walk distance (6MWD) can indicate frailty extent, cardiac dysfunction, and heart failure (HF) trajectory. Association of 6MWD with diastolic dysfunction (DD) or cardiac biomarker in community-living elderly without a history of HF remains underexplored.

Purpose
This study aims to determine the association between 6MWD, serum N-terminal prohormone of B-type natriuretic peptide (NT-proBNP), and DD in a community-living elderly population without known HF.

Methods
Between Nov 2017 and Aug 2018, 302 Hong Kong Chinese aged =60 y and without known HF were recruited into the Undiagnosed heart Failure in Older individuals (UFO) study consisting of robust, pre-frail and frail older adults stratified by FRAIL scale in a ratio of 1:1:1. 6MWD was divided into tertiles. Transthoracic echocardiography and serum NT-proBNP were used to assess cardiac dysfunction. Diastolic function was classified according to international guidelines and NT-proBNP >300 pg/ml was considered elevated.

Results
The ages of participants in the bottom, middle and top tertiles were 80.3±7.4, 73.9±6.3 and 70.0±5.7 years (P<0.01), respectively, corresponding to a female preponderance of 85.0%, 75.2%, 46.5% (P<0.01). The highest prevalence rates of hypertension (HT, 76.0% vs 68.3% vs 51.5%, P<0.01), diabetes mellitus (DM, 41.0% vs 30.7% vs 12.9%, P<0.01), and ischaemic heart disease (IHD, 14.0% vs 4.0% vs 2.0%, P<0.01) were observed in the bottom tertile of 6MWD. However, the prevalence of atrial fibrillation (AF) was distributed equally across tertiles (2.0% vs 2.0% vs 2.0%). Frail (63.0% vs 25.7% vs 3.0%, P<0.01) and pre-frail (36.5% vs 44.6% vs 24.8%, P<0.01) individuals were most frequently seen in the bottom and middle tertiles of 6MWD.

Using multiple linear regression analysis, S’ velocity, E:E’ ratio and E’ velocity were associated with 6MWD independent of age and sex. Associations between 6MWD and S’, left atrial volume index, E’ and E:E’ remained statistically significant even after adjusting for HT, DM, IHD, AF, stroke, chronic pulmonary disease and arthritis. No correlation was observed between 6MWD and left ventricular ejection fraction.

Compared with the top tertile of 6MWD, the bottom tertile was associated with increased risks for grade II–IV DD (odds ratio (OR) 3.47, 95% confidence interval (CI) 1.52–7.96, P<0.01) and NT-proBNP >300pg/ml (OR 10.20, CI 3.74–27.85, P<0.01, respectively, after adjusting for co-morbidities. The association between reduced 6MWD and elevated NT-proBNP, but not between 6MWD and DD, remained significant (OR 6.00, CI 2.06–17.46) after adjusting for age and sex. The middle tertile was not significantly associated with an
increased risk for grade II–IV DD or elevated NT-proBNP.

Conclusion(s)
In this cohort of community-living Hong Kong Chinese elderly recruited equally by frailty status, performance of 6MWD in the bottom and top tertiles was inversely associated with NT-proBNP levels but not with DD.