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The cardiac isovolumetric contraction time is an independent predictor of cardiovascular morbidity in the general population

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Background: Color Tissue Doppler imaging (TDI) M-mode through the mitral leaflet is an easy and precise method to obtain the cardiac time intervals including the isovolumic contraction time (IVCT), the isovolumic relaxation time (IVRT) and the left ventricular ejection time (ET). The myocardial performance index (MPI) is defined as [(IVCT + IVRT)/ET]). It is our hypothesis that the duration of the cardiac time intervals can reveal early cardiac dysfunction.

Purpose: Our aim was to investigate if the cardiac time intervals can be used to predict cardiovascular morbidity in the general population.

Methods: A total of 1,915 participants from the general population (mean age 58 ± 16 years, 42% male) underwent a general health examination including TDI echocardiography. The IVCT, IVRT and ET were measured. The primary endpoint was the composite of ischemic heart disease (IHD), heart failure (HF) and atrial fibrillation (AF). Participants with previous IHD, prevalent HF and AF were excluded (n = 336).

Results: During a median follow-up time of 11 years, 277 (17.5%) participants reached the composite endpoint. Assessing the association between IVCT and the composite outcome, the risk of IHD, HF and AF increased with 20% per 10ms increase in IVCT (per 10 ms increase: HR 1.20; 95% CI (1.11-1.30), p < 0.001; figure). The association remained significant even after multivariable adjustment for clinical and echocardiographic parameters (per 10ms increase: HR 1.11; 95% CI (1.01-1.22), p = 0.037).

IVRT, LVET and MPI were significant predictors of the composite outcome in unadjusted analysis (p < 0.001 for all). However, none remained significant after multivariable adjustment.

Additionally, the IVCT provided incremental prognostic information, as assessed by a significant increase in the net reclassification improvement (NRI) index, beyond the SCORE risk chart (continuous NRI, 0.266; 95% CI, 0.093-0.386) and the ACC/AHA Pooled Cohort Equation (continuous NRI, 0.252; 95% CI, 0.078-0.371).

Conclusion: In a low risk general population, the IVCT provides novel and independent prognostic information on the long-term risk of cardiovascular morbidity.

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