The prognostic impact of cardiac Metaiodobenzylguanidine imaging related to left ventricular geometry in patients with acute decompensated heart failure: a prospective study

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Background: It is known that changes in the geometry of the left ventricle (LV), such as dilation or hypertrophy, are associated with cardiovascular events. The sympathetic nervous system also plays a crucial role in exacerbating these changes. Cardiac iodine-123 metaiodobenzylguanidine (MIBG) imaging can evaluate cardiac sympathetic neuronal activity and has been strongly associated with poor clinical outcomes in heart failure (HF). However, the prognostic significance of cardiac MIBG imaging related to LV geometry is still unclear, particularly in patients admitted for acute decompensated HF (ADHF).

Methods: We studied consecutive 575 patients admitted for ADHF and echocardiography were performed just before discharge. In cardiac MIBG imaging, the heart-to-mediastinum ratio (HMR) was measured on the delayed image. We divided the patients into four groups according to the relative wall thickness (RWT) and LV mass index (LVMI) based on the ASE/EACVI classification as follows: normal (n=75), normal RWT and LVMI; concentric remodeling (n=56), high RWT and normal LVMI; eccentric hypertrophy (n=298), normal RWT and high LVMI; and concentric hypertrophy (n=146), high RWT and LVMI. The endpoint of this study was all cause death (ACD).

Results: During a follow-up period of 4.2 ± 2.5 years, 272 patients had ACDs (normal [n=32], concentric remodeling [n=28], eccentric hypertrophy [n=137] and concentric hypertrophy [n=75]). There was no significant association between LV geometry and ACDs. At univariate Cox analysis, late HMR was significantly and independently associated with ACDs in the subgroup of patients with eccentric hypertrophy (p=0.0004). However, there was no significant association between late HMR and ACDs in those with other subgroups of LV geometry. At multivariate Cox analysis, late HMR was also significantly associated with ACDs even after adjusting for major HF confounders in the subgroup of patients with eccentric hypertrophy (p=0.0042). Furthermore, Kaplan-Meier analysis revealed that patients with lower late HMR (<1.524; determined by ROC curve analysis) had a significantly higher risk of ACDs in the subgroup with eccentric hypertrophy (61% vs 37%, p<0.0001).

Conclusions: LV geometry has an impact on the prognostic value of cardiac MIBG imaging in patients admitted for ADHF.
The diagrams illustrate the relationship between HMR (heart muscle relaxation) and all-cause death rate over years of follow-up for different cardiac remodeling types.

- **Normal**
  - Higher late HMR vs. lower late HMR: p = 0.5067
  - Years of follow-up: 0, 2, 4, 6, 8

- **Concentric Remodeling**
  - Higher late HMR vs. lower late HMR: p = 0.3141
  - Years of follow-up: 0, 2, 4, 6, 8

- **Eccentric Hypertrophy**
  - Higher late HMR vs. lower late HMR: p < 0.0001
    - Adjusted HR: 2.02 (95% CI: 1.45 - 2.83)
    - Years of follow-up: 0, 2, 4, 6, 8

- **Concentric Hypertrophy**
  - Higher late HMR vs. lower late HMR: p = 0.1220
  - Years of follow-up: 0, 2, 4, 6, 8