Comparison of two classification systems for left ventricular remodeling phenotyping

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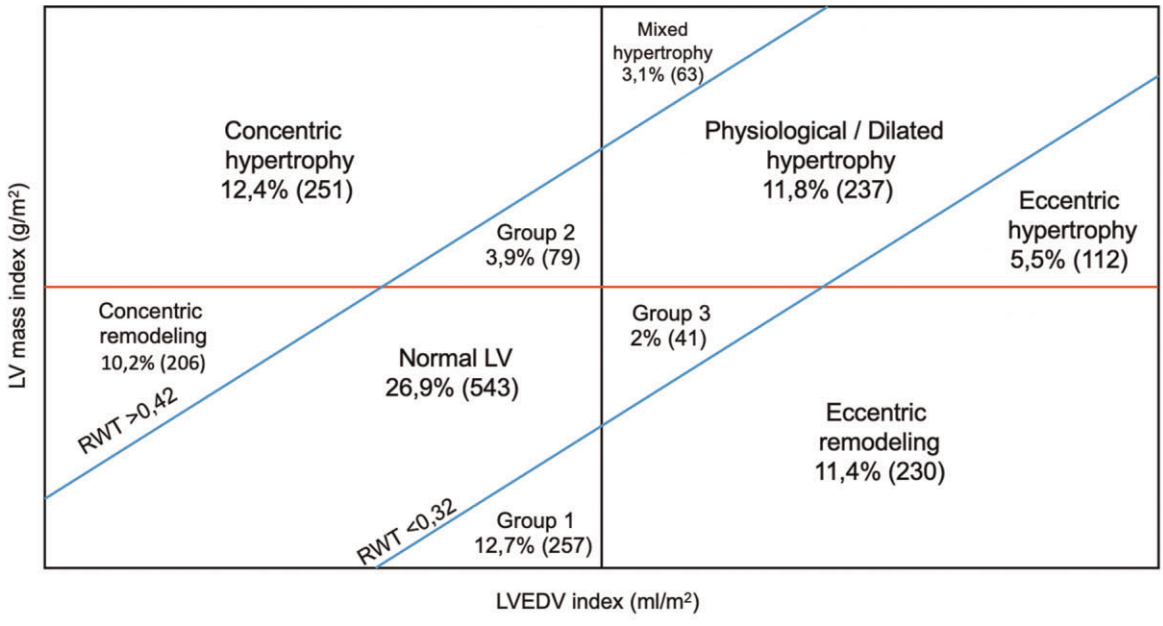
Background: Accurate classification of left ventricular (LV) geometric remodeling is vital for clinical prognosis and guiding therapy. Traditional four-type models may fail to identify subgroups with dilated LV geometry, potentially limiting prognostic stratification.
Purpose: To compare the distribution of LV geometric types using both the conventional classification and the system proposed by W. Gaasch and M. Zile, and to evaluate their respective advantages and diagnostic limitations.
Methods: A total of 2019 patients aged 18 to 94 years (mean age 57.6 ± 16.4 years; 51% male), either healthy or with cardiovascular or respiratory pathologies, underwent transthoracic echocardiography using the Esaote MyLab Seven (Italy), following standard ASE/EACVI guidelines. LV geometry was categorized using both the classical four-type classification (based on LV mass index and relative wall thickness [RWT]) and the expanded Gaasch-Zile system (which also includes LV end-diastolic volume index [LVEDVi]). Categorical variables were presented as frequencies and percentages. Statistical analysis was performed using Statistica for Windows 13.0.
Results: According to the conventional classification the following distribution was observed: normal LV geometry: 53%, concentric remodeling: 10.2%, concentric hypertrophy: 15.6%, eccentric hypertrophy: 21.2%. Of those with "normal LV geometry", 25.2% demonstrated LV dilatation, suggesting a possible misclassification. According to the Gaasch-Zile classification: normal geometry: 26.9%, concentric remodeling: 10.2%, concentric hypertrophy: 12.4%, mixed hypertrophy: 3.1%, physiological/dilated hypertrophy: 11.8%, eccentric hypertrophy: 5.5%, eccentric remodeling: 11.4%; unclassified patterns amounted to 18.6% : group 1 (RWT<0,32, normal LV mass index, normal LVEDVi) – 12.7% (n=257), group 2 (RWT = 0.32-0.42, elevated LV mass index, normal LVEDVi) - 3.9% (n=79), group 3 (RWT = 0.32-0.42, normal LV mass index, elevated LVEDVi) - 2% (n=41). Note: group 2 would be classified as "eccentric hypertrophy" using the conventional model, despite lacking LV dilation. The presence of additional geometric categories and a high proportion of unclassified cases highlight the system's complexity and broader diagnostic range.
Conclusion: The traditional LV geometric classification lacks the sensitivity to detect cases with chamber dilatation. The Gaasch-Zile model, by incorporating LV dilation, improves phenotype specificity and may facilitate more accurate prognostic assessment and personalized treatment planning.

Distribution by geometry type



•The red horizontal line separates LV hypertrophy from normal LV mass index (♂ <115 g/m², ♀ <95 g/m²)
•The black vertical line separates dilated from nondilated ventricles by LV end diastilic volume index (LVEDV) (♂ < 75 ml/m², ♀ < 62 ml/m²).
•The two oblique blue lines delimit the upper (0.42) and lower (0.32) limit of normal relative wall thickness (RWT).

Comparison of 2 classifications