Late Gadolinium Enhancement MRI Parameters Related to Ventricular Tachyarrhythmia and Subsequent Invasive Treatments in Asymmetric Septal Hypertrophic Cardiomyopathy with Preserved Ejection Fraction

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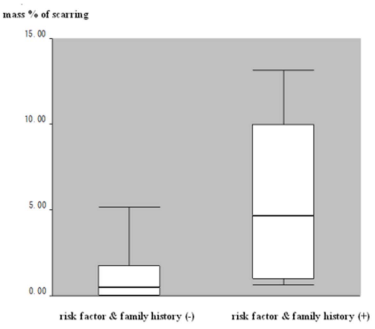
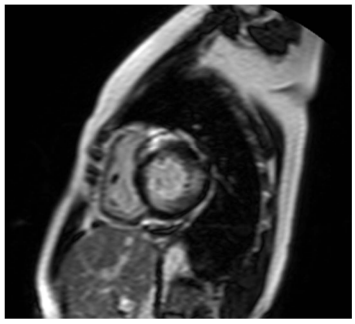
Target audiences cardiologists, radiologists

Purpose Late gadolinium enhancement (LGE) MRI is useful for noninvasive detection of myocardial scarring related to ventricular tachyarrhythmia associated with hypertrophic cardiomyopathy (HCM). However, a recent study with a sizable population with HCM does not support the close relationship. These discrepancies may have arisen from the inclusion of various phenotypes of HCM. In addition, methodology of assessment of myocardial scarring should be standardized in each phenotype of HCM. In this study, we focused on asymmetric septal HCM (ASH) with a preserved left ventricular ejection fraction (LVEF $\geq$ 50%), the most common phenotype of HCM, and examined whether LGE MRI parameters were related to ventricular tachyarrhythmia or invasive treatments for it in this condition.

Methods Fifty-three patients with a diagnosis of ASH with a preserved LVEF were enrolled. MRI was performed with a 1.5-T or 3.0-T scanner. Two-dimensional (2D) cine SSFP and LGE MRI were performed. A multivariate analysis was used to assess the capacity of patient age, family history of HCM, cardiac functional parameters (e.g., LVEF, myocardial mass, maximum wall thickness), or LGE MRI parameters (i.e., the presence of scarring, the number of scarred myocardial segments based on AHA segment model, scar mass, and mass percentage [%] of myocardial scarring) to predict the occurrence of ventricular tachyarrhythmia and the subsequent invasive treatment (e.g., ICD implantation) for it.



Results Myocardial scarring was found in 31 (58.5%) of the 53 ASH patients. A family history of HCM was observed more frequently in patients with ventricular tachyarrhythmia than in those without it ($P < 0.01$; Bar graph) and more frequently in patients who underwent invasive treatment than in those who did not ($P < 0.05$). Nine of the 12 patients with ventricular tachyarrhythmia had myocardial scarring. The number of scarred myocardial segment and the mass and mass % of myocardial scarring were greater in patients with ventricular tachyarrhythmia than in those without arrhythmia ($P < 0.05$). In the multivariate analysis, a family history of HCM and the mass % of myocardial scarring were related to ventricular tachyarrhythmia ($P < 0.01$). When the mass % of 1.6% was defined as the cutoff value, the negative predictive value for the arrhythmia was 0.91. There were associations between the arrhythmia, LVEF, or mass % of myocardial scarring and the invasive treatment for ventricular tachyarrhythmia performed within 1 year after MRI ($P < 0.01$).



Discussion In ASH with a preserved LVEF, the mass % of the scarring was related to both ventricular arrhythmia and subsequent invasive treatment for it. The lower mass % of the scarring might reflect the absence of arrhythmogenic scarring in ASH. Therefore, the mass % of myocardial scarring on LGE MRI is the significant parameter related to ventricular tachyarrhythmia and subsequent invasive treatments for it in ASH patients with a preserved LVEF.

Conclusion Quantification of the mass % of myocardial scarring is recommended to investigate the relationship between LGE MRI and ventricular tachyarrhythmia, which should be treated by ICD implantation, in ASH with a preserved LVEF.

References 1.. Adabag AS. JACC 2008; 51: 1369. 2. Maron MS. Circ Heart Fail 2008; 1: 184.

Image The patient with 5.2% scarring shows the arrhythmia and has undergone ICD implantation.