Incremental prognostic value of late gadolinium enhancement extent, transmurality, and pattern in patients with ischaemic cardiomyopathy


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Background: Presence and extent of late gadolinium enhancement (LGE) using cardiac magnetic resonance (CMR) are strong prognosticators of outcomes in ischaemic cardiomyopathy (ICM), but the prognostic value of multiple location of LGE, LGE transmurality, and midwall LGE area in addition to ischaemic LGE is not well established.

Purpose: To assess the incremental prognostic value of presence, extent, transmurality, and pattern of LGE in patients with ICM and reduced left ventricular ejection fraction (LVEF).

Methods: Between 2008 and 2022, all consecutive patients referred for myocardial viability assessment using CMR and a history of ICM (≥70% stenosis in ≥1 epicardial coronary vessel on angiography and/or history of myocardial infarction and/or coronary revascularization) and LVEF value <50% were prospectively recruited. The outcome was all-cause death using the electronic French National Registry of Death. Nested Cox proportional hazard models were used to assess the prognostic value of the following LGE features: the extent, the transmurality of subendocardial ischaemic LGE (<50%, ≥50%, or transmural), the presence of LGE in multiple areas, and the presence of midwall LGE. The additional predictive value of the LGE features was assessed by the C-statistic increment, the continuous net reclassification improvement (NRI), the integrative discrimination index (IDI) and the global Chi-2.

Results: Among the 6,082 included patients (mean age 65±12 years, 73% male, mean LVEF 43.8±5.7%), 3,591 (59%) had ischaemic LGE; 652 (10.7%) patients died during a median follow up of 9 [6.6-11.5] years. After adjustment for risk factors in the overall population, the presence of ischaemic LGE was associated with a higher risk of death (adjusted HR=3.57; 95%CI: 2.89-4.40, p<0.001). Figure 1 shows survival according to the different LGE features. Patients with both multiple localisations of ischaemic LGE area and additional midwall exhibited the highest risk of death (p<0.001). After adjustment in the subgroup of patients with ischaemic LGE (n=3,591), LGE extent (HR=1.55; 95%CI: 1.47-1.63), multiple localisations of ischaemic LGE (HR 1.61 95%CI: 1.32-1.97), LGE transmurality (HR=4.48; 95%CI: 3.39-5.93), and presence of additional midwall LGE (HR=1.77; 95%CI: 1.44-2.17, all p<0.001) were independently associated with a higher risk of death. A model combining all LGE features showed the best improvement in model discrimination and reclassification above traditional factors (C-statistic improvement: 0.17; NRI=54.1%; IDI=12.6%, Chi-2 global=1133, all p<0.001; LR-test p<0.001, Figure 2).

Conclusion: In a large cohort of ICM patients with reduced LVEF, ischaemic LGE extent, transmurality, multiple ischaemic LGE localisations, and additional presence of midwall LGE were independent prognosticators of death. A model combining all these LGE features had an incremental prognostic value over traditional prognostic factors to predict all-cause death.

Kaplan-Meier survival curves
Incremental prognostic value