T1 and T2 Mapping, T2*

Risk stratification and prognostic value of CMR in DCM; parametric mapping and GLS-value beyond EF and LGE?

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Background; Arrhythmia risk stratification and device implantation in dilated cardiomyopathy (DCM) poses significant challenges and as demonstrated by the DANISH trial appears to have reached the asymptote of clinical efficacy. A body of evidence now demonstrates that risk stratification of and device selection for DCM patients may be enhanced by inclusion of patients" LGE-status. Furthermore, it has been suggested that CMR based parametric mapping and strain analysis may further advance risk stratification.

Methods; 703 patients with DCM undergoing clinically indicated CMR scans and prospectively enrolled into the UHSM-CMR study (NCT02326324) between 03/2015-12/2018 were analysed. Multivariable Cox proportional hazard models and Youden index driven C-statistics were used to assess additive prognostic value of GLS, T1 and ECV mapping on the combined endpoint of cardiovascular death, cardiac transplantation, LVAD insertion or hospitalisation for heart failure in models incorporating NHYA class, EF and LGE status. Additionally. the value of GLS, T1, and ECV on predicting significant arrhythmic events (SAV) (ventricular arrhythmia (VA), resuscitated cardiac arrest (rCA) or sudden cardiac death (SCD)) was assessed.

Results; Patients (mean age 59, 66% male, 60% ≥NYHA II, mean EF 42%, mean GLS -12%, mean ECV 27%) were on good medical therapy (beta blocker 74%%, ACE 79%, MRA 38%, Entresto 5%, CRT 23%). Mean follow-up was 21 months; the combined endpoint occurred in 34 patients (5%). On univariate analysis NYHA class (HR 2.44 (1.67-3.57), $p < 0.001$), ECV (HR 1.14 (1.05-1.22), $p < 0.001$), GLS% (HR 1.14 (1.07-1.21) $p < 0.001$,) T1 (HR 1.06 (1.005-1.1), $p = 0.03$), RVEF (HR 0.95 (0.93-0.98), $p < 0.001$), LVEF (HR 0.92 (0.9-0.95), $p < 0.001$) were all significantly associated with outcome. On multivariate analysis only EF and NYHA class was associated with outcome.

SAV occurred as the first manifestation of disease or during follow up in 27 patients (4%). At univariate analysis LGE, ECV, GLS, EF and NYHA class were all associated with SAV. However, on multivariable analysis only EF, LGE and ECV (HR 1.11 (1.01-1.22), $p = 0.03$) but not GLS remained independently predictive in a model already incorporating EF, NYHA and LGE.

Conclusion: Optimally treated DCM populations have very low event rates. CMR based assessment of fibrosis status/burden with both LGE and ECV assessment has the potential to enhance patient selection for ICD therapy. Whilst GLS is increasingly recognised as a sensitive imaging biomarker of early disease detection it provides no additive value, likely because of it's high co-linearity with EF, in models already containing EF, NYHA class and LGE status.