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Mechanical effects of midwall fibrosis in non-ischemic dilated cardiomyopathy

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Background

In patients with non-ischemic dilated cardiomyopathy (NIDCM), mid-wall fibrosis (MWF) is associated with a higher risk of hospitalizations and death from pump failure and sudden cardiac death. The mechanical effects of MWF remain unexplored. Strain measures derived from feature tracking-CMR (FT-CMR) have been validated against myocardial tagging.

Methods

Patients (n = 84, age: 57.7 ± 14.7 yrs, [mean ± SD], LVEF: 25.7 ± 11.1%) with newly diagnosed NIDCM underwent late gadolinium enhancement CMR (inversion-recovery technique 10 min after the administration of gadolinium-DTPA (0.1 mmol/kg). Peak systolic circumferential (E_{cc}) and radial (E_{rr}) strain were assessed using FT-CMR of the mid-cavity LV short-axis cine and peak systolic longitudinal strain (E_{ll}) was assessed from the horizontal long axis cine.

Results

Patients with MWF (n = 21) had a similar LVEF to patients without (n = 63) (22.1 ± 11.7 vs 26.9 ± 10.9%, p = 0.85). Patients with MWF had reduced E_{cc} (-5.9 ± 2 vs -9.4 ± 4.9%, p = 0.001), but similar E_{rr} (12.5 ± 7.9% vs. 15.9 ± 9.4%, p = 0.31) and E_{ll} (-7.7 ± 3.5% vs -9.0 ± 6.0%, p = 0.18). In patients with similar LVEF, E_{cc} was consistently lower in those with MWF compared to those without, across a broad range of myocardial function. As shown below, MWF has the effect of altering the relationship between E_{cc} and LVEF (see Figure 1).

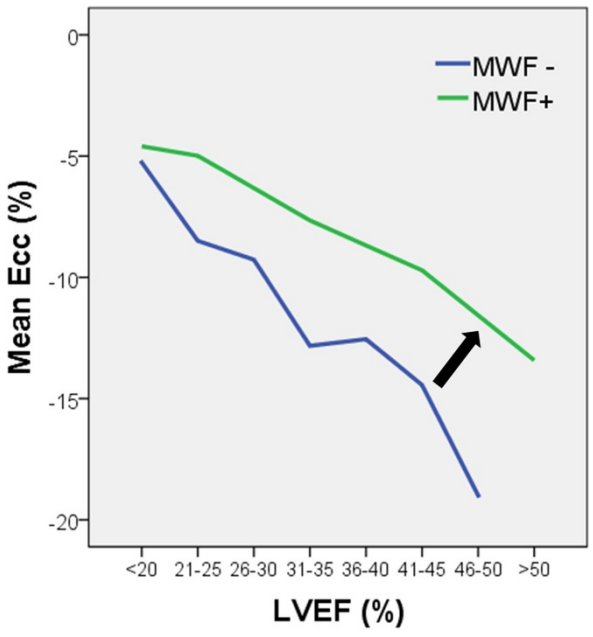

Figure 1 The relationship between Ecc and LVEF.

Conclusions

In patients with NICM and comparable LVEF, MWF is associated with impaired myocardial contraction in a circumferential direction. These findings are likely to be useful in the prognostic stratification of patients with NICM. They may also account for the recently recognised negative effects of MWF in patients undergoing CRT.

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