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Cardiac magnetic resonance characteristics of professional athletes and hypertrophic cardiomyopathy patients in the grey zone of hypertrophy

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Differentiation between athlete's heart and hypertrophic cardiomyopathy (HCM) may cause difficulties especially in patients in the grey zone of hypertrophy.

We aimed to determine conventional cardiac magnetic resonance (CMR) parameters such as left ventricular (LV) ejection fraction (EF), BSA-corrected end-diastolic (EDVi), end-systolic and stroke volume (SVi), mass (Mi), derived CMR parameters such as maximal end-diastolic wall thickness to LVEDVi ratio (EDWT/LVEDVi), LVM to LVEDV ratio (LVM/LVEDV), and CMR based strain values (global longitudinal (GLS), radial (GRS) and circumferential strain (GCS)) in male HCM patients and athletes.

We consecutively enrolled male HCM patients with only slightly elevated EDWT (13–18 mm) and highly trained healthy athletes (n=30, 18.7±1.2 training hrs/week) with marked LV hypertrophy. HCM patient group was divided into sedentary (n=30, <7 training hrs/week) and athletic HCM group (n=10; >7 h/week, 12.7±7.3 h training hrs/week).

Both sedentary and athletic HCM patients showed higher LVEF, lower LVEDVi and LVESVi and higher EDWT compared to the healthy athletes. LVMi of both healthy athletes and athletic HCM patients was significantly higher than in sedentary HCM patients, respectively (98.9±11.4; 94.5±7.8 vs 78.1±14.4 /m²). EDWT/LVEDVi ratio was higher in both sedentary and athletic HCM patients compared to healthy athletes, respectively (0.19±0.04; 0.17±0.04 vs 0.11±0.02). LVM/LVEDV also showed significant difference between HCM patients and healthy athletes. GLS and GRS showed no significant difference between the three groups, GCS was higher in athletic HCM compared to healthy athletes (−20.7±2.2 vs −17.8±2.3%).

CMR characteristics of athletic and sedentary HCM may fundamentally alter. Our preliminary data suggest that besides conventional CMR parameters, derived parameters such as EDWT/LVEDVi and LVM/LVEDV ratios and deformation imaging may also help the differentiation between pathological and physiological hypertrophy.

Figure 1. Feature tracking analysis of a healthy athlete and a patient with HCM.