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Clinical Utility of Cardiac Magnetic Resonance (CMR) in Diagnosis of Pericarditis

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Aims: The diagnosis of pericarditis based on clinical criteria can be challenging with patients often labelled with a possible rather than definitive diagnosis. We evaluated the clinical utility of CMR for the diagnosis of pericarditis.

Methods: Consecutive patients referred to Concord hospital for CMR between 2011-2024 to evaluate for pericarditis were retrospectively identified. Scans were classified as CMR-positive or CMR-negative according to the presence or absence, respectively, of pericardial inflammation (late gadolinium enhancement and/or oedema). Comparisons were made between groups with regards to clinical diagnostic criteria aetiology, disease status and biomarkers.

Results: 68 consecutive patients (mean age 45±20yrs, 41 (60%) male) had CMR at 36 (median, IQR 10-91) days following onset of symptoms. 42/68 (62%) had CMR evidence of pericarditis (CMR-positive), and of these, 15/40 (38%) did not meet clinical diagnostic criteria. Conversely, 9/23 (39%) in the CMR-negative group met clinical diagnostic criteria. Pericardial effusions were significantly more prevalent in CMR-positive patients (50.0% vs. 4.3%, $p<0.01$) while no significant difference was observed between CMR-positive and CMR-negative groups for the presence of chest pain, a friction rub, ECG changes, aetiology or disease status. Peak-CRP levels were significantly higher in CMR-positive patients (121±123mg/l vs. 25±43mg/l, $p<0.01$) while troponin levels were not (334±735ng/l vs. 249±323ng/l, $p=0.54$). CRP level demonstrated relatively good predictive value for identifying CMR-positive patients (AUC 0.77, $p<0.001$).

Conclusion: CMR identifies evidence of pericarditis in a significant proportion of patients not fulfilling standard clinical diagnostic criteria. High peak-CRP levels and the presence of a pericardial effusion both correlate with positive scans.

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CMR-Derived 4D Flow Dynamics as a Novel Indicator of Left Ventricular Diastolic Function in Obesity

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Background: 4D-flow cardiac magnetic resonance (CMR) allows for measurement of cardiac-chamber haemodynamic velocity vector fields that may form early surrogate markers of adverse remodelling, and allows evaluation of LV flow dynamics and its role in breathlessness and deconditioning associated with obesity.

Methods: We prospectively enrolled well participants from outpatient clinics (Melbourne, Australia) with 1) obesity (BMI>30), 2) dilated cardiomyopathy (DCM) with reduced left ventricular ejection fraction (LVEF) (<40%), and 3) controls with normal BMI without cardiovascular risk factors, to undergo CMR studies. We evaluated associations with Residence Time Distribution (RTD), a novel marker of flow efficiency, using left ventricular virtual particle seeding.

Results: 61 participants underwent CMR studies (20 control, 15 DCM, 26 obesity; 44% female). Control participants were younger (40 years vs. 57 years (DCM) vs. 53-years (obesity)). LVEF was comparable between obesity and control cohorts (59±5% vs 58±5%, $p=0.51$). There was a significant difference in median RTD between obesity and controls (1.47 [0.29] vs. 1.27 [0.33], $p=0.0002$), and DCM vs. controls (2.21 [0.50] vs. 1.27 [0.33], $p<0.0001$). After adjusting for age and sex, obesity was associated with a 0.3 increase in RTD (0–0.6), $p=0.05$, and DCM with a 0.9 increase in RTD (0.6–1.3), $p<0.01$.

Conclusion: Both obesity and DCM were associated with impaired left ventricular flow efficiency. This effect was attenuated by age, suggesting both age and obesity may impair efficiency of intraventricular flow. These findings warrant further studies evaluating the role of flow dynamics measurement and the obesity phenotype as a determinant of adverse remodelling and breathlessness.

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