hypertrophic cardiomyopathy (nHCM); metabolic – Type 2 diabetes (T2DM); structural – severe Aortic Stenosis (SevAS) using nBOLD CMR and b) evaluate its potential for detecting oxygenation impairment in relation to contractile and perfusion abnormalities.

Materials and Methods

113 participants including healthy controls (n=30), T2DM (n=29), nHCM (n=29), and severe AS (n=24) underwent cine, adenosine stress nBOLD CMR, first pass perfusion imaging and late gadolinium (LGE) CMR. Stress oxygenation, absolute myocardial blood flow (MBF) and global longitudinal strain (GLS) were evaluated in all patients.

Results

nHCM and SevAS had significantly thicker and fibrotic myocardium compared to controls and T2DM. Hyperaemic MBF was severely impaired in nHCM and SevAS (nHCM 2.1±0; SevAS 1.7±0.5 mL·min⁻¹·g⁻¹) relative to controls (3.0±0.9 mL·min⁻¹·g⁻¹; p<0.001), but to a lesser extent in T2DM (T2DM 2.6±0.7 mL·min⁻¹·g⁻¹; p=0.03). Stress oxygenation was significantly reduced in T2DM, nHCM and SevAS, with further differences seen between T2DM and nHCM, (CON 17.4±2.1%; T2DM 12.5 ±4.8%; nHCM 8.34±4.5%; SevAS 9.18±6.5%; p<0.0001, figure 1). Among patients, 67% had normal contractility (GLS<-15% and LVEF >52%), and 54% had preserved perfusion (segmental stress MBF>1.4 mL·min⁻¹·g⁻¹). Stress oxygenation was impaired even among patients with preserved contractility (p=0.005) and perfusion (p<0.001) versus controls.

Discussion

This is the first application of nBOLD CMR in severe AS and T2DM. T2DM had impaired myocardial oxygenation even in the presence of mild/no perfusion abnormalities, consistent with inefficient oxidative metabolism. nHCM and severe AS shared similarly blunted perfusion and oxygenation. Myocardial deoxygenation precedes contractile and perfusion abnormalities in hypertrophied hearts, highlighting the potential for stress BOLD to detect subclinical metabolic and perfusion abnormalities in cardiac diseases.

Conclusion

nBOLD CMR is a promising, precise, and contrast-agent free tool to characterise myocardial oxygenation in a diverse range of cardiovascular diseases with a potential to enhance current diagnostic and prognostic algorithms.

In this single UK tertiary centre study, we evaluated inpatient CMR referrals to investigate the impact on patient management.

Materials and Methods

Patients who had an inpatient CMR between June to December 2021 were identified. Data collected included patient demographics, indication for CMR, CMR findings and whether patient management changed following the result.

Results

There were 169 patients included within the study period. 66% were male. The mean age was 57.1 years. Primary indications for CMR included assessment of cardiomyopathies (53% patients), myocardial viability (17%) and suspected coronary artery disease (12%).

Inpatient CMR led to an additional or complete change in diagnosis in 29% patients. The commonest diagnosis post-CMR was ischaemic heart disease (infarction/ischaemic cardiomyopathy, 34%). Non-ischaemic LV dysfunction was found in 23% scans, cardiomyopathy (including HCM, infiltrative cardiomyopathies) was detected in 12% and myocarditis was diagnosed in 11%.

Discussion

This is the first study evaluating the use of inpatient CMR in the acute setting and the consequent impact on management at a tertiary centre. CMR changed patient management in 77% cases. This included medication changes, prompting further inpatient diagnostic tests or procedures (e.g. CRT/ICD) or hospital discharge. Interestingly in 6 cases, invasive coronary angiography was not performed due to the CMR result.

Image quality was diagnostic (good or adequate) in 93% cine scans and in 87% of scans with late gadolinium enhancement (LGE). Overall CMR was well tolerated in 98% patients; there was one case of contrast extravasation.

Conclusion

In this single, UK tertiary centre study we found that CMR impacted upon clinical management 77% of the time. CMR has become a vital tool in the management of cardiology inpatients particularly in the assessment of ischaemic heart disease, heart failure, cardiomyopathy and myocarditis.

REFERENCE