The role of cardiac MRI in assessing bicuspid aortic valve disease and associated myocardial fibrosis

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Results ESC sudden cardiac death risk scores were comparable between the HCM groups (HCM-M:2.2±1.5%, HCM-DM:1.9±1.2%; p=NS) and sarcomeric abnormalities were equally common. HCM-DM had the highest NT-proBNP levels (HV:428 ng/L[IQR:35–66 ng/L], DM:118 ng/L[IQR:53–187 ng/L], HCM:298 ng/L[IQR:157–837 ng/L], HCM-DM:726 ng/L [IQR:213–8695 ng/L]; p<0.0001). Left-ventricular ejection fraction, mass and wall thickness were similar between the HCM groups. HCM-DM displayed a greater degree of fibrosis burden with higher extracellular volume fraction and scar percentage, more significant reductions in global longitudinal strain and left atrial function compared to the isolated HCM. PCr/ATP was similarly decreased in the HCM-DM and DM (HV:2.17±0.49, DM:1.58±0.27, HCM:1.93±0.38, HCM-DM:1.54±0.27; p=0.0002). HCM-DM had the lowest stress myocardial blood flow (HV:2.06±0.42 ml/min/g, DM:1.95±0.41 ml/min/g, HCM:1.74±0.44 ml/min/g, HCM-DM:1.39±0.42 ml/min/g; p=0.0017).

Conclusions Comorbid diabetes adversely affects the HCM phenotype with greater reductions in myocardial energetics, perfusion, strain, increased scar burden and higher NT-proBNP levels compared to isolated HCM. Our findings suggest that specific, targeted therapeutic approaches may be useful in hypertrophic cardiomyopathy patients with diabetes co-morbidity to improve clinical outcomes.

THE ROLE OF CARDIAC MRI IN ASSESSING BICUSPID AORTIC VALVE DISEASE AND ASSOCIATED MYOCARDIAL FIBROSIS

Doppler echocardiography (TTE) remains the imaging modality of choice for the assessment of mitral inflow and left ventricular diastolic function, despite its limitations. Four-dimensional flow cardiovascular magnetic resonance (4D flow CMR) offers time-resolved cross-sectional velocity data, which can be used to investigate transvalvular peak velocity through the mitral valve. This would not suffer from the in-plane motion and angle-dependence of pulse-wave echocardiography.

Objective We aim to validate a novel time-resolved, automated dynamic 4D flow CMR peak velocity tracking method for measuring the peak velocity of mitral inflow against TTE.

Method Patients recruited to EurValve programme (n=22) underwent TTE and 4D flow CMR. Peak E-wave and A-wave velocities were recorded. This work was done in collaboration with the industry leader in 4D flow CMR (PIE Medical Imaging). Transvalvular flow segmentation was done using established valve tracking methods and the generated 3D streamlines were investigated for seeking the peak velocity inside the left ventricular cavity during diastole. Reproducibility analyses were carried out in 10 cases.

Results The peak E-wave mitral inflow velocity was comparable between the novel 4D flow method and TTE (1.09 ± 0.29 m/s and 1.10 ± 0.37 m/s respectively; p=0.60). The mean A-wave peak velocity was also comparable across both methods (0.94 ± 0.40 m/s and 0.86 ± 0.29 m/s respectively; p=0.38). The automated 4D flow method also showed good correlation with TTE for both E-wave (r=0.54; p=0.01) and A-wave (r=0.55; p=0.03) with