THE VALUE OF FEATURE-TRACKING CARDIAC MAGNETIC RESONANCE IMAGING IN DETECTING MYOCARDIAL DYSFUNCTION IN PATIENTS WITH IDIOPATHIC VENTRICULAR ARRHYTHMIAS

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Objective To investigate the added value of cardiac magnetic resonance (CMR) imaging in patients with idiopathic ventricular arrhythmias (VAs) and structurally normal hearts.

Methods Single centre prospective study in 72 patients (mean age 46 ± 16 years; 53% females) with frequent premature ventricular contractions (PVCs ≥ 500/24h) and/or non-sustained ventricular tachycardia (NSVT), an otherwise normal electrocardiogram, normal echocardiography, and no coronary artery disease.

Results CMR provided an additional diagnostic yield in 54.2% of patients. The most prevalent diagnosis was previous myocarditis (23.6%), followed by possible PVC-related cardiomopathy (20.8%), non-ischaemic cardiomyopathy (8.3%) and ischaemic heart disease (1.4%). Predictors of abnormal findings on CMR were male gender, age, and PVCs/NSVT non-outflow tract-related or with multiple morphologies. Patients with VAs had impaired peak left ventricular (LV) global radial strain (GRS) compared with controls (28.88% (IQR: 25.87% to 33.97%) vs. 36.65% (IQR: 33.19% to 40.2%), p < 0.001) and a global circumferential strain (GCS) (-17.66% (IQR: -19.62% to -16.23%) vs. -20.66% (IQR: -21.72% to -19.6%), p < 0.001). Peak LV GRS showed a good diagnostic accuracy in detecting patients from the control subjects (AUC: 0.78 (95% CI: 0.69-0.86), p < 0.001). Moreover, Peak LV GRS and GCS could differentiate between the different categories of patients.

Conclusion CMR can detect abnormalities and incipient contractile dysfunction in a significant proportion of patients with frequent idiopathic VAs, not identified on routine diagnostic work-up. Male gender, age and non-outflow tract PVC origin can be used as clinical indicators for CMR referral.

ASSESSING THE USE OF AN AI TOOL FOR GRADING CORONARY ARTERY CALCIFICATION ON NON-GATED, NON-CARDIAC CHEST CT

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Objective BSCI guidelines now recommend reporting coronary artery calciumisation (CAC) on all CTCHEST regardless of indication. This study assessed the performance of an artificial intelligence (AI) tool for the assessment of CAC presence and severity grading on routine CTCHEST.

Methods Single centre retrospective analysis of 321 non-contrast CTCHEST across all age groups aged ≥18 years-old (January-December 2015). Scans were excluded if incomplete cardiac imaging (5), slice thickness prevented AI analysis (4) or evidence of prior coronary intervention (13). Ground truth against which AI was compared was set as experienced Radiologist re-review and grading. AI processing performance and quality assurance (QA) evaluation by Radiologist were assessed. Inter-observer variability between AI and Radiologist was measured against pre-defined levels of agreement using Cohen’s k.

Results 299 were included (mean age 64±19 years, 51% female). An AI report was produced in 97% (290/299). Of these, 78% (233/299) passed Radiologist quality assurance assessment. Reasons for failure included scoring a non-vessel (23, e.g. rib/sternum, valve, central line), a non-coronary vessel (12, e.g. pulmonary vein, aorta) or artefact (22). CAC prevalence (any degree) was 7% (17/233) on initial clinical report, versus 58% (134/233) on Radiologist re-review and 57% (133/233) by AI analysis. Inter-observer agreement for CAC presence and on QA-passed imaging was excellent (k=0.92, p<0.001), and for severity grading was moderate (k = 0.60, p<0.001).

Conclusion AI analysis of non-contrast, non-gated CTCHEST is feasible, and may be more reliably performed than current standard practice. Reasons for failure are scan related and patient related.