

Machine learning identification of patients with non-ST segment elevation acute coronary syndrome using high-resolution magnetocardiography

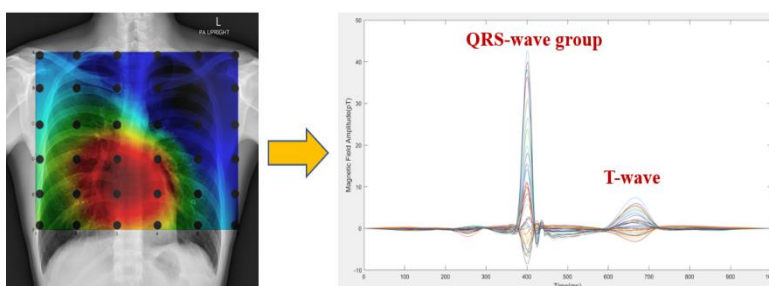
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OBJECTIVE: The aim of this study was to develop an automated method for the assessment of non-elevated acute coronary syndromes (ACS).

METHODS: Ventricular depolarising and repolarising electrical activity, including QRS wave clusters and ST-T periods, was assessed in the study population. The main field-like, time-domain-like and image-like features interpretable by electrophysiological mechanisms were extracted for modelling. 723 cases

of cardiac magnetic data were selected as the validation set, and the clinical information of the patients in the validation set was adjudicated by professional doctors, including 51 patients with ACS with ST-segment elevation, 302 patients



Sensor arrangement in the cardiomagnetic measurement plane, single-cycle complete cardiomagnetic signal

with ACS without ST-segment elevation (of which 97 were clinically diagnosed with NSTEMI, and 205 were clinically diagnosed with UA), and 370 patients with non-ACS, underwent simultaneous measurements of magnetocardiography (MCG) and electrocardiography (MEG) within a magnetically shielded device. All patients underwent coronary angiography, and all 205 patients with UA involved in this study had at least 1 coronary artery with >90% stenosis.

RESULTS: MCG had an accuracy of 86.4%, a precision of 87.2%, a sensitivity of 81.5%, a specificity of 91.1%, an F1 score of 84.3%, and an area under the ROC curve of 0.859, whereas MEG had a sensitivity and specificity of 69.4% and 73.2%, respectively.

CONCLUSION: MCG can record cardiac electrophysiological characteristics in patients with ACS and has high specificity and acceptable sensitivity in diagnosing this group of patients. Therefore, it is of great value for research and application in patients with ACS, especially in patients whose electrocardiograms do not suggest typical changes in the ST segment.

SIGNIFICANCE: The proposed diagnostic method of cardiomagnetism provides clinicians with a rapid and accurate diagnostic tool, improves the interpretability of MCG data. In addition, some of the features revealed in this study may be related to the location of ischaemia, providing opportunities for further research.