Can Magnetocardiography Distinguish Myocardial Infarction Patients from Healthy Subjects?

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Magnetocardiography (MCG) using the superconducting quantum interference device (SQUID) has been proposed as a new innovative non-invasive diagnostic tool to risk stratify patients in relation to myocardial infarction (MI) and ischemia. The purpose of this study is to identify whether MCG parameters are able to differentiate damaged myocardium due to myocardial infarction (MI) from normal myocardium. MCGs were recorded and analyzed from 106 healthy subjects (63 men, 43 women, age range 20-79, median 24 years) and 138 patients with myocardial infarction (111 men, 27 women, age range 26-81, median 60 years). All healthy subjects in this study finished the electrocardiography test and showed no abnormality. Patients were subgrouped into Q-wave MI, non-ST-elevation MI, and ST-elevation MI after undergoing ECG, troponin test, and/or coronary angiography. The MCG recordings of all subjects were obtained using a 64-channel MCG system in the magnetically shielded room. All the data were averaged centering on R-wave peak for 30 s. The signal processing software provides automatic digital filtering, averaging, synthetic gradiometer formation and baseline correction for the acquired records. Statistical analyses test were made for twenty parameters selected from QRS-, R-, T-wave, and ST-T period. Binary boundaries were found using receiver operating characteristic curve. Fifteen parameters showed the significant difference ($p < 0.05$) between healthy and MI subjects. Sensitivity, specificity, positive and negative predictive value of the parameter, map angle maximum, showing the highest accuracy (0.80) were 73.2, 88.7, 89.4 and 71.8 %, respectively, for the detection of MI ($p < 0.05$). In conclusion, our study showed the MCG parameters are potentially useful to screen MI patients out of healthy people.

Keywords : Magnetocardiography, diagnosis, myocardial infarction, parameter, and accuracy