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Accuracy of ECG Criteria for the Diagnosis of Left Ventricular Hypertrophy: A Comparison with Magnetic Resonance Imaging

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Abstract

Background: There are many ECG criteria for the diagnosis of left ventricular hypertrophy (LVH). There are, however, limited data on the accuracy of these criteria in comparison with cardiac magnetic resonance (CMR).
Objective: To determine the accuracy of ECG criteria for the diagnosis of LVH using CMR as the gold standard and to assess gender-specific data.
Material and Method: Patients who were referred for CMR for clinical purposes were studied. ECG and CMR were performed on the same day. Functional CMR protocol was performed for the assessment of cardiac volume, function and mass. CMR variables were indexed by the adjustment of body surface area. The following ECG criteria were used: Romhilt- Estes criteria (score at least 4 or 5 points were used in the present study), Sokolow-Lyon and Sokolow Lyon-Rappaport, Cornell voltage and Cornell product, and sum of QRS voltage of all 12 leads. CMR of 184 subjects (120 females, 64 males) free of cardiovascular disease was used as controls. Patients with left ventricular mass index above 95 percentile of gender specific left ventricular mass in control group were considered LVH. Diagnostic yield of ECG criteria for LVH was calculated for the whole group and each gender.
Results: There were a total of 1,882 patients, 994 males and 888 females. Average age was 64.6 + 11.3 years. LVH was diagnosed by CMR in 23.3% in female and 25.4% in male. ECG criteria for the diagnosis of LVH had a relatively low sensitivity (0.25-0.61), and high specificity (0.75-0.95). Female had a lower sensitivity, higher specificity, higher PPV, similar NPV, and higher overall accuracy than male. Cornell product, Romhilt-Estes (at least 4 points) and Sokolow-Lyon were the ECG criteria with the best accuracy, sensitivity and specificity, respectively.
Conclusion: ECG criteria for the diagnosis of LVH had a relatively low sensitivity, and high specificity. The accuracy was in the range of 0.71-0.80. Cornell product had the highest accuracy.

Keywords: ECG, Left ventricular hypertrophy, Sokolow-Lyon, Cornell voltage, Cornell product, Romhilt-Estes

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