Validation of Electrocardiographic Criteria for Predicting the Culprit Artery in Patients with Acute Myocardial Infarction

Niek van der Putten*, Peter Rijnbeek, Arnold Dijk, Gerard van Herpen, Enno van der Velde, Jonathan Lipton and Jan Kors

Thoraxcenter, Erasmus Medical Center Rotterdam, Netherlands

Many criteria have been proposed to predict the culprit artery from the ECG in patients with ST-elevation acute myocardial infarction (STEMI). We previously presented the validation of two such criteria on a large independent data set. The objective of this study is 1) to compare seven criteria for predicting the culprit artery, and 2) to assess the performance of these criteria for patients with acute myocardial infarction (AMI) who do not meet the STEMI criteria. We performed a retrospective analysis of patients who underwent percutaneous coronary intervention of a single vessel for treatment of AMI. A digital ECG was made within two hours prior to the first balloon inflation. ECG measurements were obtained with the Modular ECG Analysis System. A variety of criteria for detecting the culprit artery, including recent criteria proposed by Fiol, Tierala, and Wang, were compared in patients with or without STEMI. The study population consisted of 475 patients (LAD 197, RCA 197, LCx 81) of whom 61.9% fulfilled STEMI criteria. Overall, the criteria of Tierala performed best on the STEMI cases with an accuracy of 97.5% for LAD, 91.4% for RCA, and 88.8% for LCx, but specificity for RCA (86.3%) was low and sensitivity for LCx (29.0%) disappointing. The performance significantly decreased on non-STEMI patients. For example, the accuracy of the Tierala criteria in this subgroup was 75.8% for LAD, 74.2% for RCA, and 78.8% for LCx (specificity LAD only 71.6%, sensitivity RCA 20.3%, and sensitivity LCx 2.3%). We conclude that the Tierala criteria have the highest accuracy for detecting the culprit artery in STEMI cases, but some specificity and sensitivity values were low. Moreover, accuracies significantly decrease in patients who do not meet the STEMI criteria. Improved criteria that better predict the culprit artery in the whole group of AMI patients are currently under investigation.