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Hyperacute T-wave in the early diagnosis of acute myocardial infarction

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Background: The clinical significance of prominent T-waves, also referred as hyperacute T-waves, in the early diagnosis of acute myocardial infarction (AMI) is unknown.

Purpose: To evaluate the clinical utility of hyperacute T-waves in the early diagnosis of AMI.

Methods: In a prospective diagnostic study enrolling patients presenting to the emergency department (ED) with symptoms suggestive of AMI, final diagnoses were adjudicated by two independent cardiologists based on clinical information including cardiac imaging. Electronic electrocardiogram data were available in 2946 consecutive patients. Patients with left ventricular hypertrophy, complete left bundle branch block or pacemaker were excluded from further analysis. In the remaining 2382 patients, the T-wave amplitude was automatically derived from the standard 10 seconds 12-lead ECG recorded at presentation to the ED using an established algorithm.

Results: Median (IQR) time from chest pain onset (CPO) to ED presentation was 5 (IQR [2.5, 12.2]) hours. A total of 219 patients (9%) presented to the ED within 1h or less from CPO. AMI was the final diagnosis in 18% (NSTEMI in 15%, STEMI in 3%) of patients. High T-wave amplitude in leads AVF, III and V1 were associated with AMI. Optimal cut-offs were derived to achieve a predefined positive predictive value (PPV) of at least 75%. These criteria were 473mV, 357mV and 483mV for AVF, III and V1, respectively. With these cut-offs 1.4%, 4.2% and 0.9% of all patients with AMI were detected and specificity was 99.9% (95% CI [99.7%, 100%]), 99.7% (95% CI [99.4%, 99.9%]) and 99.9% (95% CI [99.8%, 100%]). However, majority of the patients with AMI correctly identified by the hyperacute T-wave had also significant ST-element elevations (AVF: 5 out of 6; [83.3%]; III: 10 out of 18 [56%]; V1:1 out of 4; [25%]).

Conclusion: In patients presenting to the ED with symptoms suggestive of AMI, only leads AVF, III and V1 showed hyperacute T-waves with high PPV. However, incidence of this finding is very low. In addition, majority of the cases correctly identified by hyperacute T-waves also had concomitant ST-segment elevations. Therefore, hyperacute T-waves have only very limited utility in the early diagnosis of AMI in the ED.

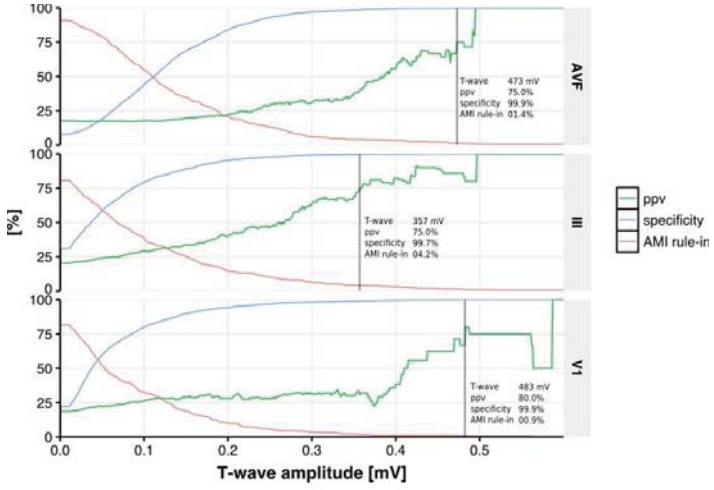

Figure 1 shows positive predictive value (green), the specificity (blue) and the percentage of all patients with an acute myocardial infarctions in the rule-in group (red) for all cutoff values for positive T-wave amplitudes in leads AVF, III and V1.