

# A comprehensive and easy-to-use ECG algorithm to predict the coronary occlusion site in ST-segment elevation myocardial infarction

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**Background:** Several electrocardiogram (ECG) criteria have been proposed to predict the location of the culprit occlusion in specific subsets of patients presenting with ST-segment elevation myocardial infarction (STEMI).

**Purpose:** The aim of this study was to develop, through an independent validation of currently available criteria, a comprehensive and easy-to-use ECG algorithm, and to test its diagnostic performance and reliability in real-world clinical practice.

**Methods:** We analyzed ECG and angiographic data from 408 consecutive STEMI patients submitted to primary percutaneous coronary intervention, dividing the overall population into derivation (306 patients) and validation (102 patients) cohorts. In the derivation cohort, we tested >60 previously published ECG criteria, using the decision-tree analysis to develop the algorithm that would best predict the infarct-related artery (IRA) and its occlusion level.

We further assessed the new algorithm diagnostic performance and reliability in the validation cohort.

**Results:** In the derivation cohort, the algorithm correctly predicted the IRA in 91% of cases and both the IRA and its occlusion level (proximal vs. mid-distal) in 73% of cases. When applied to the validation cohort, the algorithm resulted in 90% and 69% diagnostic accuracies, respectively. In a real-world comparative test, the algorithm performed significantly better than expert physicians in identifying the site of the culprit occlusion ( $p=0.026$  vs. best cardiologist and  $p<0.001$  vs. best emergency medicine doctor). The algorithm showed almost perfect reliability (Cohen's kappa 0.86) between a cardiologist and an ambulance paramedic.

**Conclusions:** Derived from an extensive literature review, this comprehensive and easy-to-use ECG algorithm can accurately predict the IRA and its occlusion level in all-comers STEMI patients.

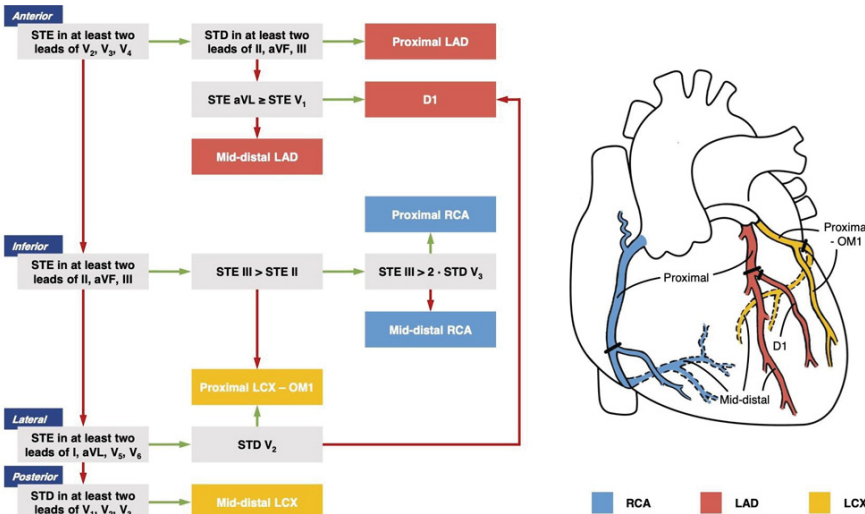


Figure 1. Algorithm

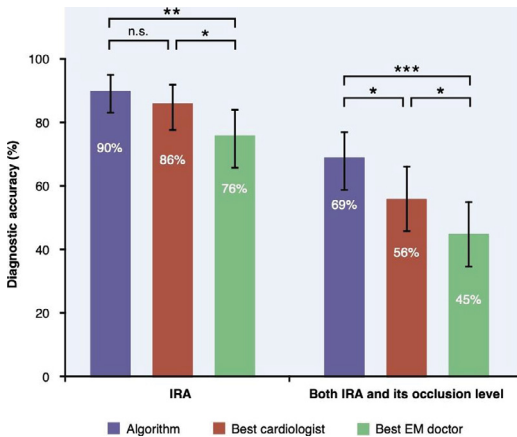


Figure 2. Diagnostic accuracy of the algorithm