Early diagnosis of myocardial infarction in patients presenting late after chest pain onset

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Background: The European Society of Cardiology (ESC) recommends the clinical use of the 0/1h-algorithms in patients with suspected acute coronary syndrome (ACS) to rule-out or rule-in non-ST elevation myocardial infarction (NSTEMI). However, the diagnostic performance of the ESC 0/1h-algorithms was only validated in patients presenting within 12 hours after chest pain onset (=early presenters) to the emergency department (ED). To this date, evidence regarding their performance in patients with chest pain onset >12h (=late presenters) is lacking.

Purpose: To evaluate the diagnostic performance of the ESC 0/1h-algorithms in late presenters.

Methods: We prospectively enrolled patients presenting to the ED with symptoms suggestive of ACS such as acute chest discomfort. Two independent cardiologists adjudicated the final diagnoses based on all available clinical information including serial hs-cTn concentrations, follow-up information and cardiac imaging. Hs-cTnT/I concentrations at 0h and 1h were measured in a blinded fashion. The primary diagnostic endpoint was the diagnostic performance of the hs-cTnT/I ESC 0/1h-algorithms in patients presenting late after chest pain onset compared to those presenting early. Diagnostic performance was quantified by safety of rule-out (sensitivity and negative predictive value), accuracy of rule-in (specificity and positive predictive value), and efficacy (proportion of patients) classified as rule-out or rule-in within 1 hour after presentation to the ED. The primary prognostic endpoint was all-cause mortality after 30-days and two-years in patients in whom NSTEMI was ruled-out by the ESC 0/1h-algorithms.

Results: Among 4733 patients, 308/4733 (7%) presented late to the ED. The ESC hs-cTnT 0/1h-algorithm ruled-out 185/308 (60%) of late presenters with a sensitivity of 100% (95% CI, 93.7–100) and a negative predictive value (NPV) of 100% (95% CI, 98.0–100). Sixty-one of 308 (20%) were ruled-in with a specificity of 95.2 (95% CI, 91.8–97.2) and a positive predictive value (PPV) of 80.3% (95% CI, 68.7–88.4). The remaining 62/308 (20%) were classified as observe with a NSTEMI prevalence of 13%. In comparison, 59% of early presenters were ruled-out (sensitivity 99.3% [95% CI, 98.4–99.7]; NPV 99.8 [99.5–99.9]), 17% were ruled-in (specificity 96.2 [95% CI, 95.5–96.8]; PPV 81.4 [95% CI, 78.4–84.0]), and 45% were classified as observe. Late presenters in whom NSTEMI was ruled-out had 30-day and two-year survival rates of 100% and 98.2%, respectively. Similar findings were made for the ESC hs-cTnI 0/1h-algorithm.

Conclusion: The ESC hs-cTnT/I algorithms also provide excellent diagnostic performance for early triage and specifically safe rule-out of NSTEMI in patients presenting late after chest pain onset to the ED.