Characteristics and outcomes of patients with suspected acute myocardial infarction according to rising and falling patterns of high-sensitive cardiac troponin

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Introduction: Current guidelines and Universal Definition of Myocardial Infarction (UDMI) recommend using rising and falling patterns (RP and FP, respectively) of high-sensitive cardiac troponins (hs-cTn) equally to distinguish acute from chronic myocardial injury.

Purpose: To compare patients with RP and FP and assess the diagnostic performance of the ESC 0/1 and 0/3 hour (h) algorithms using a RP or FP.

Methods: Prospectively enrolled patients with suspected MI (excluding those with ST-elevation) were stratified according to their troponin deltas. A RP was defined by an elevation and a FP as a decline in hs-cTnI of ≥2 or >6 ng/L between baseline and 1 or 3h later, respectively. All other patients were classified stable. Three independent cardiologists adjudicated the final diagnoses according to the 3rd UDMI. Our primary endpoints were efficacy measures (positive predictive value [PPV] and specificity in % [95% confidence intervals]) of both algorithms. Patients were followed for up to 4 years for a combined endpoint of all-cause death, incident MI, revascularization or cardiac rehospitalization.

Results: In total, 3,528 patients (age 64.0 (52.0, 74.0), males 64.0%) were included, of those 418 (11.8%) had a FP and 829 (23.5%) a RP. Compared to patients with a RP, those with a FP had similar age (67.0 [55.0, 76.0] vs. 67.0 [56.0, 75.0]), had generally less cardiovascular risk factors and the number of angiographies was lower (39.5% vs. 58.0%), while the number of late-presenters (>6h after symptom onset) was higher (66.4% vs. 48.8%). The prevalence of MI was higher in the RP (22.6% vs 29.1%). The risk of experiencing the combined endpoint was significantly higher for both, FP and RP, with a greater risk for a RP (age-/sex adjusted (adj) HR 1.6 [9%%CI 1.4, 1.9]) than a FP (adjHR 1.3 [95% CI1.2, 1.5]) compared to stable patients (p<0.001, respectively). Overall, patients with AMI and a FP had the highest event rate (Figure). The PPV and the specificity to rule-in MI using both algorithms was significantly higher for patients with RP (0/1h: PPV 75.8 [70.3, 80.7], specificity; 72.3 [66.2, 77.9]; 0/3h: PPV 73.8 [69.9, 77.4], specificity 63.1 [58.1, 67.9]) compared to those with FP (0/1h: PPV 51.0 [42.7, 59.3], specificity 70.1 [63.9, 75.8]; 0/3h: PPV 57.0 [49.4, 64.3], specificity 74.0 [68.6, 78.9]).

Conclusion: Despite the known elevated risk of dynamic hs-cTnI changes (defining myocardial injury), patients with FP are at even greater risk for future events despite having fewer cardiovascular risk factors. The rule-in of MI using established and recommended stratification algorithms is worse in these patients, wherefore the equal treatment of a FP and RP should be questioned.