Study confirms safety of rapid algorithm to rule-out and rule-in myocardial infarction

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Patients with symptoms suggestive of acute myocardial infarction (AMI) account for about 10% of all emergency department consultations. Rapid identification of AMI, which may be life-threatening, allows the early initiation of evidence-based therapy. Rapid and safe rule-out of AMI allows the timely detection and treatment of alternative causes of acute chest pain—many of which are benign, in which case patients can be reassured and sent home.

ESC guidelines recommend a 0/1-hour algorithm for patients with suspected non-ST-elevation myocardial infarction (NSTEMI).2 Decisions are made using high-sensitivity cardiac troponin (hs-cTn) blood concentrations at presentation and one hour, in conjunction with clinical assessment and an electrocardiogram (ECG). This allows for quicker triage than the previous 0/3-hour algorithm, but there have been questions about the safety of the new procedure.

This study evaluated the diagnostic performance of the 0/1-hour algorithm using hs-cTnT and hs-cTnI. The study used pooled patient-level data from the prospective APACE and BACC studies.3 A total of 4 350 patients presenting with acute chest pain to the emergency departments of 14 hospitals in six European countries were included.

Hs-cTnT and hs-cTnI blood concentrations were measured at presentation and after one hour. Safety of the algorithm was quantified by the negative predictive value for rule-out of NSTEMI. Performance of the 0/1-hour hs-cTn rule-in, which aims to identify patients eligible

for early coronary angiography, was quantified by the positive predictive value for NSTEMI. Efficacy of the algorithm was quantified by the proportion of patients triaged to either rule-out or rule-in.

NSTEMI was the final diagnosis in 17% of patients. Safety of the 0/1-hour algorithm was very high with both hs-cTn assays: negative predictive values for NSTEMI were 99.8% using hs-cTnT and 99.6% using hs-cTnI. Rule-in performance was good, with a positive predictive value of 74.7% using hs-cTnT and 64.2% using hs-cTnI. Efficacy was very high, with more than two-thirds of patients assigned to either rule-out or rule-in.

Results were similar for the clinically challenging subgroup of patients presenting early (less than three hours) after chest pain onset, with negative predictive values of 99.5% and 99.2% for hs-cTnT and hs-cTnI assays, respectively.

"With this large multicentre analysis using central adjudication we were able to address concerns regarding the suitability of the 0/1-hour algorithm for routine clinical care," said lead author Dr Raphael Twerenbold, senior researcher and cardiology fellow in the Cardiovascular Research Institute Basel, Switzerland. "We found that the algorithm, using either assay, was safe and effective in triaging patients with suspected acute myocardial infarction. Of note, safety was also excellent in the largest ever tested population of patients presenting within the first three hours after chest pain onset."

Prof Christian Mueller, last author and director of the Cardiovascular Research Institute Basel, concluded: "These findings are of immediate and critical clinical relevance as many institutions worldwide are considering switching to the implementation of an accelerated, high-sensitivity cardiac troponin-based diagnostic protocol such as the 0/1-hour algorithm recommended by the ESC."

Provided by European Society of Cardiology

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