Early diagnosis of acute myocardial infarction in patients with a history of percutaneous coronary intervention

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Background: Recurrence of acute chest pain after percutaneous coronary intervention (PCI) is common. The early detection of acute myocardial infarction (AMI) as a possible cause of acute chest pain can be challenging in patients with a history of PCI due to e.g. pre-existing electrocardiographic abnormalities. It is unknown, whether high-sensitivity cardiac troponin T (hs-cTnT) concentrations and hs-cTnT-based rapid algorithms perform equally well in patients with a history of PCI.

Purpose: To investigate the impact of prior PCI on the diagnostic performance of hs-cTnT concentrations for early rule-out and rule-in of AMI.

Methods: In an ongoing multicentre international study, we prospectively enrolled unselected patients presenting to the emergency department (ED) with symptoms suggestive of AMI. Final diagnoses were centrally adjudicated by two independent cardiologists using all available medical records obtained during clinical care including 90 day follow-up information and cardiac imaging. High-sensitivity cTnT concentrations at presentation and after 1h were compared against the adjudicated final diagnosis. Patients were stratified according to the presence or absence of previous PCI.

Results: Among 5536 patients (1313 with and 4223 without previous PCI), incidence of AMI was significantly higher in patients with previous PCI (26.3% versus 21.4%; $p<0.001$). Patients with prior PCI and a final diagnoses other than AMI had significantly higher concentrations of hs-cTnT at presentation to the ED (median 9ng/l [IQR 6 to 15.8] vs 5.5ng/l [IQR 3 to 10]; $p<0.001$). However, in patients with final adjudicated diagnosis of AMI, hs-TnT concentrations at presentation were lower in patients with previous PCI (median 46ng/l [IQR 23 to 94] vs 55ng/l [IQR 25 to 175]; p=0.003). The diagnostic accuracy of hs-cTnT was high in patients with history of PCI, but significantly lower compared to patients without PCI (AUC 0.91 [95% CI 0.89–0.92] versus AUC 0.94 [95% CI 0.94–0.95]; $p<0.001$, respectively). When applying the ESC 0/1-algorithm among patients with previous history of PCI, the rule out pathway showed also very high safety in patients with a history of PCI (sensitivity 99.2 [95% CI 97.2–99.8] and negative predictive value 99.6 [95% CI 98.5–99.9]). However, the efficacy of the ESC 0/1h-algorithm for early rule out of NSTEMI was lower in the PCI group compared to no PCI (45.2% vs 65.1%; $P<0.001$, respectively), triaging more patients to the observe zone (36.8% versus 18.8%; $p<0.001$). Time to discharge from the ED was significantly longer in patients with prior PCI (334 min vs 290 min; $p<0.001$). When stratified for index AMI, patients with history of PCI waited longer for a final diagnoses of AMI (285 vs 217 min; $p<0.001$).

Conclusions: History of PCI impacts on the diagnostic performance of hs-cTnT. Although the ESC 0/1h-algorithm still performs very safe when applied to patients with a history of PCI, its efficacy is significantly reduced.