Diagnosis of acute myocardial infarction in the presence of left bundle-branch block

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Topic(s):
Coronary Artery Disease: Noninvasive Diagnostic Methods

Citation:
European Heart Journal (2019) 40 (Supplement), 1674

Objective: Patients with suspected acute myocardial infarction (AMI) in the setting of left bundle branch block (LBBB) present an important diagnostic and therapeutic challenge to the clinician.

Methods: We prospectively evaluated incidence of AMI, and diagnostic performance of specific electrocardiographic (ECG) and high-sensitivity cardiac troponin (hs-cTn) criteria in patients presenting with chest discomfort to 26 emergency departments in three international, prospective, diagnostic studies. Presence of LBBB, ECG criteria, and final diagnoses were centrally adjudicated by two independent cardiologists using the fourth universal definition of myocardial infarction.

Results: Among 8830 patients, LBBB was present in 247 patients (2.8%). AMI was the final diagnosis in 30% of patients with LBBB, with similar incidence in those with known LBBB versus those with presumably new LBBB (29% vs 35%, p=0.42). ECG criteria had low sensitivity (1–12%), but high specificity (95–100%). The diagnostic accuracy as quantified by the receiver-operating-characteristics curve of hs-cTnT and hs-cTnI concentrations at presentation (AUC 0.91; 95% CI 0.85–0.96 and 0.89; 95% CI 0.83–0.95) as well as that of their 0/1h and 0/2h changes was very high. A diagnostic algorithm (Figure 1) combining ECG criteria with hs-cTnT/I concentrations and their absolute changes at 1h or 2h derived in cohort 1 (45 of 45 (100%) of patients with AMI correctly identified), showed high efficacy and accuracy when externally validated in cohort 2 & 3 (28 of 29 patients, 97%).

Conclusion: Most patients presenting with suspected AMI and LBBB will be found to have diagnoses other than AMI. Combining ECG criteria with Hs-cTn testing at 0/1h or 0/2h allows early and accurate diagnosis of AMI in LBBB.
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Figure 1