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Early QW duration, depth and area in prediction of reperfusion success in patients with ST-segment elevation myocardial infarction treated with primary percutaneous coronary intervention - a CMR study

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Background: Pathological Q-wave (QW) in the electrocardiogram (ECG) before primary percutaneous coronary intervention (primary PCI) is a strong prognostic marker in patients with ST-segment elevation myocardial infarction (STEMI). However, current QW criteria are either not clinical applicable or have a lack of diagnostic performance. Furthermore, the term "pathological" QW is debatable given that even patients with large pathological QW do have substantial myocardial salvage index. Accordingly, we evaluated the association between QW duration, depth, area (QW morphology) and non-viable myocardium, myocardial salvage index as well as microvascular obstruction (myocardial salvage index and microvascular obstruction are considered reperfusion success) using cardiac magnetic resonance imaging (CMR).

Methods: A total of 516 patients with their first STEMI had obtained an ECG before primary PCI and an additional CMR performed acute at day 1 (interquartile range [IQR], 1-1) and at follow-up at day 92 (IQR, 89-96). The largest measurable QW in ECG was used for analysis of QW morphology. A new QW criteria (Copenhagen QW criteria) composite of duration and depth as well as a new QW area criteria were made using ROC-analysis, and were compared with modified Minnesota criteria.

Results: The QW morphology was strongly associated to all CMR endpoints (p=<0.0001) and showed a strong linear correlation with final infarct size, final transmurality and final myocardial salvage index (p=<0.0001). The diagnostic performance of QW morphology, Copenhagen QW criteria and QW area criteria was over-all comparable to the modified Minnesota criteria in prediction of non-viable myocardium.

Conclusion: QW morphology in STEMI patients has a strong linear association with reperfusion success. The larger final infarct size, final transmurality or lower final myocardial salvage index the larger QW morphology. Hence, it is suggested that the term pathological is not used as a dichotomous condition in patients with STEMI but rather evaluated on the basis of extent.