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Early electrocardiographic changes as markers of coronary microvascular obstruction in acute myocardial infarction with ST segment elevation

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Background: Coronary microvascular obstruction (CMVO), occurs frequently even after a quickly epicardial revascularization of the infarct-related artery (IRA), and has been associated with an increased risk of adverse cardiovascular events and poor prognosis in patients with ST-segment myocardial infarction (STEMI). After primary coronary intervention (PCI), incomplete ST-segment elevation (STE) resolution in the ECG has been related to CMVO and worse clinical outcome. However, there is lack of information regarding other ECG changes. The aim of this study is to describe the initial ECG changes in STEMI and evaluate their association with CMVO.

Methods: From January 2007 to December 2017, all patients with the diagnosis of STEMI that underwent urgent coronary angiography were retrospectively included. Clinical, echocardiographic, and electrocardiographic data were taken from medical records. A univariate and multivariate analysis was performed to evaluate the relationship between initial ECG changes (before PCI) and CMVO defined as final TIMI <3 in the IRA.

Results: 1022 patients were included; the mean age was 67.8 years (±14), 73.7% were male and 14.4% had previous coronary artery disease. The most frequent IRA was the anterior descending artery in 43.2% of the cases and CMVO was found in 18.3% of the patients. The mean value of STE sum (defined as the sum of STE in V1-V6, I and aVL in anterior STEMI and the sum of II, III, aVF, V5 and V6 in non-anterior STEMI), maximum STE in one lead and number of leads with STE was 11.36mm (± 8.2), 3.65mm (± 2.3) and 4.14mm (± 1.4), respectively. After a univariate analysis, STE sum, maximum STE in one lead and number of leads with STE were associated with CMVO, while only STE sum remained significantly associated with the presence of CMVO after a multivariate analysis (Table). The resolution of STE in the first 2 hours after PCI was a protector factor for CMVO.

Conclusion: Initial ECG changes such as STE sum, number of leads with STE and maximum STE in one lead can be used as early predictors of CMVO and poor prognosis. STE resolution in the first 2 hour was associated with a lower incidence of CMVO as reported in previous studies.

Univariate and Multivariate Analysis

	Univariate			Multivariate		
Variables	OR	95% CI	p	OR	IC 95%	p
Sum of STE	1.03	1.01–1.04	0.013	1.03	1.01–1.05	0.005
Number of leads with STE	1.13	1.02–1.26	0.021	1.04	0.87–1.23	0.67
Maximum STE	1.09	1.02–1.16	0.016	1.04	0.92–1.17	0.49
Resolution of STE	0.35	0.25–0.49	<0.001	0.36	0.25–1.18	<0.001

STE, ST-segment elevation.

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