Abstract: P6600

Cardiac electrical biomarker retains memory of myocardial ischemia not severe enough to cause myonecrosis.

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Topic(s):
Acute Myocardial Ischemia

Citation:

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Background: "Cardiac electrical biomarker" (CEB) is a numerical index measured by the Vectraplex ECG (vECG) System with Vectraplex AMI software that detects changes in the cardiac electrical fields from dipolar to multipolar vectors during myocardial ischemia. CEB has been validated with ECG traces derived from patients with acute myocardial infarction. However the threshold of CEB for diagnosis of NSTEMI is varied between studies.

Purpose: To examine the effect of myocardial ischemia during transient coronary occlusion on CEB and the time-course of its recovery.

Method: Seventy-five consecutive patients with normal (without Q waves, ST-T changes, arrhythmias, bundle branch blocks, left ventricular hypertrophy etc) surface ECG (sECG) had CEBs measured from vECGs recorded before, during and 1, 2 and 3 hours after balloon occlusion during elective percutaneous coronary intervention (PCI). HsTnI was measured before and 1, 2 and 3 after the procedure. The balloon was inflated to the clinically indicated pressures till the appearance of symptoms and/or ST changes or to a maximum of 90 seconds. Ischemia induction during balloon occlusion was confirmed by the presence of ST-T changes on sECG and/or TIMI-0 flow on angiogram. Multiple vECGs were recorded at each balloon occlusion. Every vECG used to derive CEBs was adjudicated for quality by 2 observers blinded to the results. vECGs with wandering baseline, transient arrhythmias, bundle branch blocks etc. were discarded. The highest CEBs derived from best traces were analysed. The pre- and post-PCI CEBs, were compared with the maximum CEB during balloon occlusion using Wilcoxon rank and Friedman test.

Results: Fifteen subjects with negative FFR and 2 subjects with totally occluded arteries that could not be revascularised were excluded. Mean duration of balloon occlusion resulting in the highest CEB was 54.1 secs. The maximum CEB was reached in 20, 27 and 11 patients during pre-dilatation, stent deployment and post-dilatation respectively. The CEB increased with balloon inflation (pre-PCI median(interquartile range, IQR) 53.5(31-105) vs balloon occlusion 202(108-332), p<0.0001). The CEB during balloon occlusion gradually recovered over 1, 2 and 3 hrs post-PCI (vs 74.5(35-135), p<0.0001; vs 66(37-118), p<0.0001; vs 58.5(29-97), p<0.0001 respectively). The 1hr (p=0.0011) and 2hr (p=0.0352) post-PCI CEB remained higher than pre-PCI CEB and returned to the pre-PCI level at 3h post-PCI (p=0.4433). All except 2 patients had normal 3hr TnI; both being below the threshold for diagnosis of peri-procedural MI.

Conclusion: CEB increases with short transient coronary artery occlusion not severe enough to cause myocardial necrosis and took 3 hours to return to the pre-procedural level suggesting its feature of "ischemic memory". Thus CEB may have a value in detecting an ischemic episode in patients with chest pain but without a raised hs-Tn.
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