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A comparative echocardiographic study on the effectiveness of ischemic preconditioning and postconditioning in female rat hearts

Introduction: Both ischemic preconditioning (IPre) and postconditioning (IPost) are well known endogenous adaptive mechanisms of the myocardium. However, there are limited data whether ischemic preconditioning or postconditioning is the more effective cardioprotective mechanism.

Methods: Female Wistar rats were divided into four groups: control group underwent sham operation, animals of the ischemic group were subjected to 30 min of in vivo regional test ischemia/reperfusion by the ligation of the left descending coronary artery, ischemic preconditioned animals were subjected to 3 intermittent periods of 5-min ischemia/reperfusion followed by test ischemia/reperfusion and ischemic postconditioned animals underwent 3 intermittent periods of 30-second ischemia/reperfusion after the test ischemia. One week after the surgeries, serum troponin I (TnI) levels were measured to assess the severity of myocardial infarction and transthoracic echocardiography was performed to monitor cardiac morphology and function.

Results: Serum TnI level was significantly increased in the ischemic group as compared to the control group (86.6 ± 11.2 vs. 1.6 ± 0.3 ng/ml; $p < 0.05$), however, TnI level was significantly decreased both by IPre and IPost as compared to the ischemic group (43.3 ± 11.3 and 62.5 ± 12.7 vs. 86.6 ± 11.2 ng/ml; $p < 0.05$, respectively). Among morphological parameters, left ventricular end diastolic and end systolic diameter were significantly decreased only by IPre as compared to ischemic group (5.0 ± 0.3 vs. 6.2 ± 0.3 mm and 2.6 ± 0.4 vs. 3.9 ± 0.4 mm; $p < 0.05$, respectively). Among functional parameters, left ventricular ejection fraction and right ventricular fractional area change failed to be significantly improved by IPre or IPost as compared to the ischemic group.

Conclusions: One week after myocardial infarction, morphological parameters were improved only by IPre, however, functional parameters have been affected neither by IPre nor by IPost in an experimental rat model of myocardial infarction.

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