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The use of hypothermia of heart by MET cooler used in the treatment of STEMI significantly reduces infarct size (microvascular obstruction (MVO)) and reduces the impairment of left ventricular systolic function in an animal study

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Introduction: Current treatment for myocardial infarction (MI) involves the reduction of two modifiable, affecting the area of damage to the heart and patient outcome: i.e. the time from the first signs of MI to opening occluded artery (the shorter the damage less) and the use of appropriate pharmacological treatment. Modification of metabolic activity seems to be possible third aim modifiable which may have an impact on damage to the left ventricular (LV) in the course of MI, especially during the critical ischemia. The use of periodic hypothermia during acute cardiac ischemia in order to reduce the level of metabolic activity of the heart tissue can significantly reduce the area of LV damage and improve the patient's prognosis.

Aim: Evaluation of MI- caused LV damage was performed by MRI (1.5T MR (GE)) with DE function (delayed enhancement) and MVO (microvascular obstruction) in STEMI by applying direct heart hypothermia.

Methods: The study was conducted on animal models. For this purpose, there were 20 animals (pigs) randomized to the study - 10 animals to study group (SG) and 10 to control group (CG). At the baseline, there were no significant differences in the age of the animals, sex, and anthropometric parameters. Animals in the CG were sequentially given analgesia, sedation and respiratory therapy. Then the MRI was performed with assessment of LV function and assessment of microvascular obstruction (MVO, microvascular obstruction) with a quantitative estimation of MVO. Then the coronary angiography was performed with extended (60 minutes) POBA LAD (target prox / mid LAD with a diameter of 2.5-3.0 mm behind DG1). 48 hours since POBA, there was MRI evaluation made in CG (MRI CG2). In SG MRI and POBA LAD were performed. Subsequently, dry puncture of pericardium (pericardial catheter inserted to pericardial sac) with 12 h procedure of direct hypothermia of heart was performed (saline cooled to 30°C). 48 hours since POBA LAD the MRI was performed for estimation of LV systolic function and MVO (MRI SG2).

Results: Comparison of baseline EF and MVO in CG1 and SG1 showed no significant differences (all $p > 0.05$). MVO was significantly reduced at SG2, and EF was significantly greater in SG2 comparison to the CG2. Similarly, for the EF and MVO significant difference was observed between the SG2 and CG2 ($p < 0.001$).

Conclusion: The use of direct hypothermia of heart by METcooler in STEMI significantly reduced the extent of damage of left ventricle.

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