Research on characteristics of left ventricular microcirculation perfusion and systolic function in different conditions of stunned myocardium by real-time myocardial contrast echocardiography and speckle tracking imaging

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View from specialist: It is creative, and of certain scientific and educational value.

[ABSTRACT] Objective: To study the changes of left ventricular microcirculation perfusion and systolic function of stunned myocardium in dogs as well as the relationship between them by real-time myocardial contrast echocardiography (RT-MCE) and two-dimensional speckle tracking imaging (STI) in order to explore biological characteristics of stunned myocardium by imaging methods. Methods: Open-chest beagle dogs were divided into 3 groups: short time stunned group, long time stunned group and sham operation group. The acute myocardium ischemia was induced by ligating left anterior descending coronary artery for 15 min (short time stunned group) or 45 min (long time stunned group), followed by 120 min of reperfusion treatment, MCE and STI were performed before ischemia treatment, 15 min or 45 min after ischemia, as well as 10 min, 30 min, 60 min, 90 min, 120 min after reperfusion. The myocardium was examined by transmission electron microscopy. Results: Compared with baseline data and data of sham operation group, the peak systolic radial (RS) and myocardial blood flow (A · β) of Ischemic segments in long time stunned group and short time stunned group decreased significantly. A · β was progressively improved with reperfusion going. RS further decreased with reperfusion time going until 30 min after reperfusion, subsequently progressively improved. But A · β and RS did not reach the pre-ligation level at 120 min of reperfusion. There were linear relationship between the myocardial blood flow (A · β) and peak systolic radial (RS), the correlation coefficient with regression equation was $Y = 0.443 + 49.64X, r = 0.80, R^2 = 0.64, P = 0.031$ (long time stunned group); $Y = -2.184 + 56.88X, r = 0.78, R^2 = 0.60, P = 0.039$ (short time stunned group). Conclusions: Microcirculation perfusion of stunned myocardium could be detected by STI. Based on MCE and STI, dynamic biological characteristics of stunned myocardium could be detected reliably.

[KEY WORDS] Real-time myocardial contrast echocardiography; Speckle tracking imaging; Stunned myocardium