[gw22-e0343]

THE STUDY OF BONE MARROW STROMAL STEM CELLS TRANSPLANTATION VIA CORONARY ARTERY AFTER ACUTE MYOCARDIAL INFARCTION IN THE DOGS

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10.1136/heartjnl-2011-300867.404

Objective To investigate the capability of autologous bone marrow stromal stem cells for repair of damaged myocardium through the establishment of acute myocardial infarction model and the inducement of bone marrow stromal stem cells.

Methods Twelve hybrid dogs were randomly separated into two groups including the control group (n=6) and the cell transplantation group (n=6) according to the date of surgical operation. Anterior descending coronary arteries of hybrid dogs were ligated to establish the models of acute myocardial infarction. Autologous bone marrow stromal stem cells induced and cultured in vitro were labeled and transplanted into myocardium via coronary artery 1–2 h after acute myocardial infarction in the cell transplantation group, and the same volume of culture media was transplanted into those in the control group. Echocardiography and PET (myocardial perfusion and metabolism) were applied 7 days and 11 weeks after operation. Then the hybrid dogs were executed and the hearts were obtained for immunohistochemical analysis.

Results Compared with control group, LVEF in cell transplantation group was significantly higher than that of control group ($p<0.05$) 11 weeks after MSSCs implantation, the improvement of myocardial segment in cell transplantation group was higher than that of control group ($p<0.05$). The PET (myocardial perfusion and metabolism) 11 weeks after operation had no significant difference with 1 week after operation in control group. Compared with 1 week after operation, the blood current and metabolism 11 weeks after operation in cell transplantation group was not improved in dead myocardium, but this was improved in survival myocardium, and the radioactivity of survival myocardium was higher, hinting myocardial hypertrophy. In cell transplantation group, BrdU and Troponin I and Connexin 43 positive stain were tested with immunohistochemistry, then those were negative in control group.

Conclusions Bone marrow stromal stem cells survived and propagated in survival myocardium after transplantation via coronary artery. These cells can improve the blood perfusion and metabolism of survival myocardium, improve LVEF and myocardial function.