

INTRAMYOCARDIAL TRANSPLANTATION OF BONE MARROW MONONUCLEAR CELLS IMPROVES CARDIAC FUNCTION AND REDUCES SCAR FORMATION AFTER ACUTE EXPERIMENTAL MYOCARDIAL INFARCTION

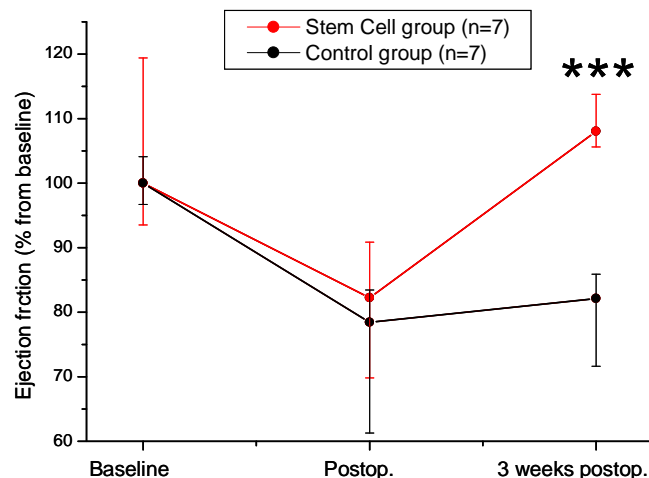
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Introduction

Stem cell therapy for myocardial infarction is under intensive investigation. There is still controversy of the optimal transplantation technique, and quality as well as quantity of the cells transplanted. Also the mechanisms of recovering process and cell differentiation require more profound research. The goal of the study was to test the hypothesis that intramyocardial transplantation of bone marrow mesenchymal stem cells could improve cardiac function after experimental acute myocardial infarction.

Materials and Methods

Fourteen juvenile pigs (mean weight of 24,3 kg) were randomized to the stem cell group (n=7) and the control group (n=7). For all animals myocardial infarction was resulted in by 90 minutes occlusion of the CX-coronary artery with a removable silicone loop. Bone marrow cells were harvested before operation. Immediately in stage of reflow, autologous purified stem cells (100 mill. cells/2 ml) or saline (2 ml) were transplanted by direct injection into the myocardium. Troponin I and CK-MBm were used as biochemical markers. Systolic and diastolic function of the heart were measured by echocardiography pre- and postoperatively and 3 weeks after myocardial infarction. Hearts were harvested and histopathologic examination was performed.



Results

The groups did not differ significantly in any preoperative values. In both groups, there was observed a significant release of heart enzymes postoperatively compared to baseline values, which indicated a critical size infarction. The ejection fraction (EF) decreased after the infarction in both groups ($P < 0.05$). The EF in the stem cell group improved significantly compared to the control group at 3 weeks postoperatively (***) ($P=0.003$).

In histopathological examinations stem cells could be found in severe infarcted areas 3 weeks postoperatively.

Conclusions

Autologous stem cells transplanted by intramyocardial injection into the infarcted area seems to remain in the myocardium and reduce scar formation or modulate scar

development. These findings suggest that the experimental infarcted area and cardiac function recovers following stem cell transplantation.