Fibrin Glue Alone and Skeletal Myoblasts in a Fibrin Scaffold Preserve Cardiac Function after Myocardial Infarction.

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Abstract:

Current efforts in cardiac tissue engineering center around the use of scaffolds that deliver cells to the epicardial surface. In this study, we examined the effects of fibrin glue as an injectable scaffold and wall support in ischemic myocardium. The left coronary artery of rats was occluded for 17 min, followed by reperfusion. Echocardiography was performed 8 days after infarction. One to 2 days later, either 0.5% bovine serum albumin (BSA) in phosphate-buffered saline, fibrin glue alone, skeletal myoblasts alone, or skeletal myoblasts in fibrin glue were injected into the ischemic left ventricle. Echocardiography was again performed 5 weeks after injection. The animals were then sacrificed and the hearts were fresh frozen and sectioned for histology and immunohistochemistry. Both the fractional shortening (FS) and infarct wall thickness of the BSA group decreased significantly after 5 weeks ($p = 0.0005$ and 0.02, respectively). In contrast, both measurements for the fibrin glue group, cells group, and cells in fibrin glue group did not change significantly (FS: $p = 0.18$, 0.89, and 0.19, respectively; wall thickness: $p = 0.40$, 0.44, 0.43, respectively). Fibrin glue is capable of preserving infarct wall thickness and cardiac function after a myocardial infarction in rats and may be useful as a biomaterial scaffold for myocardial cell transplantation.