

Brief Report

Stem Cells Implant in the Heart. Outcomes at 43 months

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Background

Heart failure following a myocardial infarction is one of the major problems a cardiologist has to deal with. The reduction in the number of cardiac myocytes with subsequent formation of unfunctional fibrotic scars produces irreversible damage for cardiac function. Recent studies have demonstrated that implant of bone marrow stem cells in the myocardium offers a new possibility to recover systolic function after myocardial infarction. These preliminary data suggest the feasibility of implanting bone marrow stem cells in patients with dilated cardiomyopathy secondary to coronary heart disease.

Objectives

To assess the feasibility and safety of bone marrow stem cells implant in the heart of patients with ventricular dysfunction secondary to necrotic scars, and to evaluate changes in clinical symptoms and segmental wall motion of areas of non-viable tissue during long-term follow-up.

Material and Methods

We included 13 male patients (mean age 53.6 ± 10.3 years) with an average follow-up of 43 months. A total of 88 segments had fibrotic tissue (6.77 segments per patient). Concomitant coronary artery bypass graft surgery was performed in remote ischemic and viable areas. Patients were evaluated with dobutamine stress echocardiography, color kinesis and radionuclide ventriculography.

Results

The cell suspension contained $0.7\% \pm 0.4\%$ CD34+ cells. Cell viability was greater than 95%. Stem cells were implanted by 33.07 ± 8.2 injections during coronary surgery via sternotomy with an average of 5.93 ± 2.2 ml of solution in akinetic and metabolically non-viable segments. Adverse outcomes were not reported during hospitalization. Mean New York Heart Association functional class improved from 2.4 ± 0.5 to 1.1 ± 0.3 ($p < 0.0003$), the ejection fraction increased from $26.4\% \pm 8.6\%$ to $34.6\% \pm 13\%$ ($p < 0.001$). Left ventricular diastolic diameter did not vary during follow up. Postoperative tests, performed by independent observers, demonstrated functional recovery in 47% of the segments implanted. Four patients died during follow-up: three of extracardiac causes and one of heart failure.

Conclusions

These findings demonstrate feasibility and safety in the implantation of stem cells. The recovery of non-viable segments suggests functional efficacy at long-term follow-up; however, further controlled studies are necessary to confirm these results.