Encouraging experience with intracardiac transplantation of unselected autologous bone marrow cells concomitant with coronary artery bypass surgery after myocardial infarction

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Background
Chronic heart failure after myocardial infarction is still a serious problem without a fundamental therapy. Experimental transplantation of bone marrow cells (BMC) into infarcted myocardium resulted in regeneration and functional improvement.

Objective
Clinical investigation of safety and efficacy of intracardiac transplantation of unselected autologous BMC.

Method
22 patients scheduled for elective and isolated coronary artery bypass grafting (CABG) with a reduced LVEF due to myocardial infarction were included. Intraoperatively, sternal bone marrow blood was aspirated, and a sterile buffy coat was prepared and applied. 19 age, LVEF and coronary disease matched patients served as controls. Heart function, geometry, and scar proportion were assessed by echocardiography and Gadolinium-MRI at the time of the operation and 6 months thereafter. Results: Transplanted patients received a mean number of \(360 \times 10^6\) BMC. We did not notice any significant differences in early or late complications in the transplant group as compared to controls. At six months follow up only the transplanted patients showed a significant improvement of NYHA classes from 2.7 to 1.5 and of LVEF from 36 to 43 %, \(p < 0.05\). Furthermore, only CABG concomitant with BMC-TX led to a significant reduction of left ventricular end diastolic diameter (LVEDD) from 59 to 54 mm and of scar proportion of the infarcted segments from 2.53 to 2.42, \(p < 0.05\).

Conclusion
Intracardiac transplantation of unselected, autologous BMC is safe and feasible. In adjunct with coronary revascularization it leads to an improvement of ventricular geometry and function. Moreover, it reduces myocardial scar proportion and heart failure symptoms.