The efficiency of autologous bone marrow stem cells in STEMI patients with systolic dysfunction - ECG-gated SPECT myocardial perfusion and echocardiography approach

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Introduction: Ischemic cardiac disease remains one important cause of mortality worldwide and patients with deprived ejection fraction after myocardial infarction have a poor outcome. Stem cell treatment based on the capacity of these cells to regenerate and restore cardiac function is appealing and could represent a salvage therapeutic option.

Purpose: One of the aims of the project was to evaluate the efficiency of autologous mononuclear stems cells in patients with acute myocardial infarction and systolic dysfunction compared to a control group using a complex imaging strategy: scintigraphy and echocardiography.

Methods: Eighteen patients with anterior myocardial infarction with ST segment elevation (STEMI) and left ventricle ejection fraction (LVEF) <40% were selected to be included in the study and further on were divided in 2 groups (stem cells receivers and controls). The patients in both groups were maximally treated accordingly to current guidelines. After obtaining the informed consent, the stem cell group received at about 7 days after myocardial infarction the mononuclear cells injection into the coronary artery. Mononuclear cells were obtained by iliac crest puncture, separated by density gradient and administered after 5 hours. During the 24 months follow-up, all patients were examined with the same paraclinical and imagistic methods (2D and 3D echocardiography, speckle tracking), but also by scintigraphy.

Results: Stem cells administration was no associated with any adverse effects in the follow-up period. From our study group we selected two case-control patients. The patient treated with stem cells at 24 months after STEMI had a decrease in stretch mark scar on perfusion scintigraphy suggestive of myocardial regeneration, an 25% increase in systolic thickening in injured segments and statistically significant increase in ejection fraction (12% raise). Whereas the control patient had extensive perfusion defect, absence of myocardial regeneration, ventricular wall thinning, severe disorder of systolic thickening kinetics- dyskinesia- with a 20% augmentation of ventricular end-diastolic volume and a 4% drop in ejection fraction estimated by biplane Simpson and 3D ultrasound, data in accordance with speckle tracking analysis.

Conclusions: At 24 months, improvement of ejection fraction was observed in patients treated with autologous mononuclear stem cells, evaluation performed both by echocardiography and myocardial scintigraphy.