Bone Marrow Cells Aid Systolic Function in HF

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TORONTO — Intracoronary transfer of autologous bone marrow cells led to improved left ventricular function after acute MI in a randomized trial.

After 6 months, there was a highly significant increase in mean left ventricular ejection fractions (LVEFs) in acute MI patients after intracoronary injection of bone marrow cells, according to data from the Bone Marrow Transfer to Enhance ST-Elevation Infarct Regeneration (BOOST) study. But treatment did not appear to affect left ventricular remodeling.

"The results from the BOOST trial indicate that intracoronary transfer of autologous bone marrow cells is safe, and enhances left ventricular function" after an MI, Kai Wollert, M.D., said at the annual meeting of the Heart Failure Society of America.

Emerging evidence suggests that direct injection of stem cells and progenitor cells derived from bone marrow can improve cardiac function in patients after acute MI. Although only 30 patients were treated with bone marrow cells in the BOOST trial, the results are promising, said Dr. Wollert of Hannover (Germany) Medical School.

"Subgroup analysis must be viewed with caution, considering the size of our study population," Dr. Wollert said. "However, it was encouraging to see that the effects of bone marrow transfer were observable in all investigated subgroups—men and women, older people, younger people—regardless of the prevalence of risk factors, the time from symptoms to PCI [percutaneous coronary intervention], the infarct localization, and the baseline ejection fraction, or baseline infarct size."

In the BOOST trial, 60 patients (42 men, 18 women) were evenly randomized after successful PCI to receive optimal medical treatment or optimal medical treatment plus intracoronary transfer of autologous bone-marrow cells 5 days after PCI or 6 days after symptom onset.

There were no significant differences between groups in regard to age, major cardiovascular risk factors, time from symptoms to PCI, infarct size, or treatment with thrombolytics or ACE inhibitors during the primary intervention. More than 90% of patients received aspirin, ACE inhibitors, -blockers, and statins—both at discharge and at 6 month follow-up.

Investigators harvested 128 mL of bone marrow from the posterior iliac crest, which was reduced to an average volume of 26 mL. The final preparation contained 25 x 10^8 nucleated cells and 9 x 10^6 CD 34–positive stem cells. Bone marrow cells were infused into the infarct-related coronary artery via a balloon catheter. Four to five infusions were performed per patient.

Dr. Wollert said the study's institutional review board would not allow sham catheterizations, but MRI investigators were blinded to the treatment assignment. The primary end point was change in global LVEF from baseline to 6 months' follow-up, as determined by cardiac MRI.

After 6 months, mean global LVEF had increased by 6.7% in the bone-marrow-cell group vs. 0.7% in the control group, a highly significant difference. LVEFs in the treatment group were 50% at baseline and 56.7% at 6 months vs. 51.3% and 52.0%, respectively, in the control group.

There was no significant difference between groups in regional wall motion from baseline to follow-up. However, transfer of bone marrow cells enhanced left ventricular systolic function primarily in the border zones of the infarct.

The secondary end point of left ventricular end-diastolic volume index (LVEDVI) increased for both groups during the 6-month follow-up. But the difference in LVEDVI change was not significantly different between the two groups, suggesting that bone marrow cell transfer does not affect left ventricular remodeling after MI, Dr. Wollert said.

Cell transfer did not increase the risk of adverse events, in-stent restenosis, or proarrhythmic effects. There was no significant difference in extrasystole between groups, although there was a trend toward fewer ventricular extrasystole in the bone marrow cell transfer group.

Dr. Wollert said that future studies should utilize a double-blind design with sham catheterizations, and ultimately address the impact of bone marrow transfer on clinical end points in a large patient population. ■