Outcomes for treating heart failure with cell therapy, high-dose ultrasound

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Treatment that consisted of shock wave (procedure using high-dose ultrasound)-mediated preconditioning of the target heart tissue prior to administration of bone marrow-derived mononuclear cells was associated with significant, albeit modest improvement in left ventricular ejection fraction (a measure of how well the left ventricle of the heart pumps with each contraction) after 4 months in patients with chronic postinfarction heart failure, according to a study in the April 17 issue of *JAMA*. The results, which require confirmation in larger trials, demonstrate the potential for this type of therapy to reduce adverse clinical events in these chronically ill patients.

"Regenerative therapies have emerged as a promising novel approach to improve heart function and prevent the development of end-stage heart failure. Application of various cell types including bone marrow-, heart tissue- or adipose tissue-derived cell populations were shown to improve cardiac functional recovery. In patients with acute myocardial infarction [heart attack], recent meta-analyses suggested a moderate but sustained enhancement of left ventricular function and improved clinical outcome following administration of bone marrow-derived mononuclear cells (BMCs)," according to background information in the article. "Extracorporeal shock wave treatment has been experimentally shown to increase homing factors in the target tissue, resulting in enhanced retention of applied BMCs."

Birgit Assmus, M.D., of Goethe University Frankfurt, Germany, and colleagues conducted a study to test the hypothesis that shock wave-

facilitated cell therapy could improve the efficacy of intracoronary application of autologous (the donor and recipient are the same person) BMCs in patients with chronic postinfarction heart failure. The randomized, placebo-controlled trial was conducted between 2006 and 2011. The interventions included low-dose (n=42), high-dose (n=40), or placebo (n=21) shock wave pretreatment targeted to the left ventricular anterior wall. Twenty-four hours later, patients receiving shock wave pretreatment were randomized to receive intracoronary infusion of BMCs or placebo, and patients receiving placebo shock wave received intracoronary infusion of BMCs.

The researchers found that the primary end point (change in LVEF from baseline to 4 months) was significantly improved in the shock wave + BMCs group (absolute change in LVEF, 3.2 percent), compared with the shock wave + placebo infusion group (1.0 percent). Regional wall thickening improved significantly in the shock wave + BMCs group (3.6 percent) but not in the shock wave + placebo infusion group (0.5 percent). Overall occurrence of major adverse cardiac events was significantly less frequent in the shock wave + BMCs group (n=32 events) compared with the placebo shock wave + BMCs (n=18) and shock wave + placebo infusion (n=61) groups.

"The results demonstrate that shock wave-facilitated infusion of BMCs beneficially affects global and regional left ventricular contractile function [improved pump function of the heart] and may reduce adverse clinical events in these chronically ill patients," the authors write. "However, the observed beneficial effects on clinical outcome require confirmation in larger clinical end point trials."

More information: *JAMA*. 2013;309(15):1622-1631