Exercise Capability and Myocardial Perfusion in Chronic Angina Patients Treated with Enhanced External Counterpulsation

J. TARTAGLIA, M.D., J. STENERSON, JR., M.D.,* R. CHARNEY, M.D., S. RAMASAMY, M.D.,* B. L. FLEISHMAN, M.D.,† P. GERARDI, M.D., J. C. K. HUI, PH.D.‡
New York Medical College, Valhalla; *New York United Medical Center, Port Chester, New York; †Grant Medical Center Hospital, Grant/Riverside Methodist Hospitals, Columbus, Ohio; ‡Cardiology Division, Department of Surgery, State University of New York, Stony Brook, New York, USA

Summary

Background: Enhanced external counterpulsation (EECP) has been shown to improve treadmill times and myocardial perfusion. However, improvement in perfusion defects has been demonstrated only in patients exercised to the same cardiac workload on the post-EECP as the pre-EECP stress test.

Hypothesis: This study was to determine the effect of EECP on exercise capacity and myocardial perfusion by comparing results of maximal exercise radionuclide testing pre- and post-EECP treatment.

Methods: This prospective study included 25 patients with angina who had performed maximal symptom-limited exercise tolerance tests (ETT) with Bruce protocol and radionuclide perfusion single-photon emission computed tomography (SPECT) study prior to and at completion of EECP treatment.

Results: After 35 h of EECP, 23 patients (93%) improved by at least one functional angina class. There is a significant improvement in their total treadmill times (357 ± 93 to 449 ± 97 s, p < 0.001). There was a significant change in their peak double products, from 18,891 ± 3,939 pre-EECP to 20,464 ± 4,305 post-EECP ETT (p < 0.03). Pre EECP, 16 patients had ST-segment depression on their initial ETT. After EECP, 13 of these patients (80%) either no longer had ST depression or had a significant increase in their time to ST depression (229 ± 52 to 315 ± 60 s, p < 0.001). The radionuclide perfusion scores also showed a significant reduction in ischemic segments (16.36 ± 10.52 to 14 ± 10.9, p < 0.05).

Conclusions: Patients treated with EECP demonstrated a reduction in angina symptoms, improvement in exercise capacity, increase in time to ST-segment depression, and decrease in perfusion defects despite performing at a higher workload.

Key words: external counterpulsation, angina, radionuclide perfusion, ST depression

Dr. Hui is an employee and member of the Board of Directors of Vasomedical, Inc., a company that manufactures and markets the EECP device described in this paper. Dr. Tartaglia owned stock in Vasomedical at the time this paper was written; he no longer does.

Address for reprints:
Joseph Tartaglia, M.D.
311 North St.
White Plains, NY 10605
e-mail: josephtartaglia@yahoo.com

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