Enhanced External Counterpulsation Does Not Alter Arterial Stiffness in Patients with Angina

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Summary

Background: Enhanced external counterpulsation (EECP) is a noninvasive treatment for angina that acutely augments diastolic pressure and reduces cardiac afterload. However, the mechanism of the sustained clinical benefit seen with this therapy is not known.

Hypothesis: The study aimed to determine whether EECP leads to an improvement in arterial stiffness.

Methods: In all, 22 men and 1 woman with angina (age 63.6 ± 6.7 years, mean ± SD) were studied prior to and after 35 h of EECP therapy over 7 weeks. We measured carotid-radial (C-R) pulse wave velocity (PWV), and aortic augmentation index (AI) was derived from radial and carotid artery waveforms using applanation tonometry. Seventeen patients underwent treadmill exercise testing before and after the 7 weeks of EECP.

Results: After EECP therapy, despite a significant improvement in treadmill exercise time and a reduction in systolic and diastolic blood pressures, there was no significant change in any arterial stiffness parameters: Mean C-R PWV was 8.4 ± 0.8 m/s at baseline and 8.0 ± 1.2 m/s after 7 weeks of EECP, mean change: −0.4, 95% confidence interval (CI): −1.0, +0.2, p = 0.17. Mean radial-derived AI was 25.7 ± 10.4% before and 24.6 ± 10.8% after, mean change: +1.1%, 95% CI: −2.3, +4.5, p = 0.53. Median AI-carotid was 31.5% before and 28.7% after; median change: −0.5, interquartile range: −9.5, +3.5, p = 0.32. Nineteen patients returned for 6-month recordings; neither blood pressure nor arterial stiffness readings were significantly different from baseline.

Conclusion: Enhanced external counterpulsation therapy does not significantly alter arterial stiffness. Other than an initial reduction in blood pressure, the sustained clinical benefit seen with this therapy is unlikely to be effected through alterations in arterial wall mechanical properties.

Key words: enhanced external counterpulsation, arterial stiffness, hemodynamics, augmentation index

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