Changes of cerebral blood flow velocities during enhanced external counterpulsation.


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OBJECTIVES: Intra-aortic counterpulsation is the most frequently used cardiac assist device. However, there are only few studies of the effects of counterpulsation on cerebral blood flow and these report conflicting outcomes. The new enhanced external counterpulsation (EECP) technique reproduces non-invasively the effects of intra-aortic counterpulsation. In this study, we evaluated effects of EECP on blood pressure (BP) and on cerebral flow velocity (CBFV).

SUBJECTS AND METHODS: Twenty-three healthy controls and 15 atherosclerotic patients each underwent a 5-min session of EECP. Before, during and after EECP we monitored heart rate, beat-to-beat radial artery BP and CBFV.

RESULTS: EECP induced a second increase in BP and CBFV during diastole with a significant increase of mean BP and a decrease of systolic BP in patients and controls. Mean CBFV increased in both groups during the first 5 s of EECP. After 3 min of EECP, diastolic CBFV was still higher than at baseline, but systolic CBFV was lower than at baseline; mean CBFV was as low as before EECP in the patients and lower than the baseline values in the controls. Three minutes after ending EECP, mean and systolic BP were lower in the patients than the corresponding baseline values. Otherwise, CBFV and BP values did not differ from baseline in patients and controls.

CONCLUSION: Cerebral autoregulation ensures the constancy of cerebral blood flow even though EECP creates marked systemic changes. In the patients, the decrease of BP after EECP with maintained CBFV indicates an improved BPCBFV relation and a more economic autoregulation.