

Improving Walking Ability and Ankle Brachial Pressure Indices in Symptomatic Peripheral Vascular Disease with Intermittent Pneumatic Foot Compression: A Prospective Controlled Study with One-year Follow-up

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J Vasc Surg 2000;31:650-61

Purpose: Intermittent pneumatic foot compression (IPC_{foot}) augments arterial leg inflow. It has been suggested that prolonged use of impulse leg compression at home might ameliorate claudication caused by peripheral vascular disease by improving collateral circulation. The purpose of this study was to determine the effect of IPC_{foot} treatment on claudication distance and arterial hemodynamics in patients with intermittent claudication caused by peripheral vascular disease.

Methods: Thirty-seven patients with stable intermittent claudication were admitted to this prospective controlled study. Of these, 25 patients received IPC_{foot} (>4 hr / d) for 4.5 months (group 1), and the other 12 patients acted as control patients (group 2). Both groups were advised to exercise unsupervised for a minimum of 1 hour daily and received aspirin (75mg/d). Groups were matched for age, sex, risk factors, claudication distances, and ankle pressures at baseline. In each patient, initial claudication distance (ICD), absolute claudication distance (ACD), resting ankle brachial index (r-ABI), ankle brachial pressure index after exercise (p-eABI), and popliteal artery volume flow were measured at day 0, 2 weeks, and 1, 2, 3, and 4.5 months. On completion of the treatment period (4.5 months), both groups continued with aspirin (75mg/d) and unsupervised exercise and were re-examined after 12 months. Data analysis is based on non-parametric statistics, the Wilcoxon signed ranks test, and the Mann-Whitney test for intragroup and intergroup comparisons, respectively. Results are expressed as median and interquartile ranges.

Results: Over the 4.5 months of active treatment, (1) median ICD in group 1 increased by 146% ($P < .001$), from 78 m (interquartile range, 65-102 m) at baseline to 191.5 m (interquartile range, 127-254 m); ICD did not significantly increase in group 2; (2) median ACD in group 1 improved by 106% ($P < .001$), from 124 m (interquartile range, 100-160 m) to 255 m (interquartile range, 149-398 m); no significant changes were documented in group 2; (3) median r-ABI in group 1 rose by 18% ($P < .001$), from 0.57 (interquartile range, 0.48-0.62) to 0.67 (interquartile range, 0.64-0.70); no improvement was noted in group 2; (4) median p-eABI in group 1 rose by 110% ($P < .001$), from 0.21 (interquartile range, 0.07-0.27) to 0.44 (interquartile range, 0.36-0.52); no changes were noted in group 2; and (5) median popliteal artery volume flow in group 1 improved by 36% ($P < .001$), from 100 mL/min (interquartile range, 59-163 mL/min) to 136 mL/min (interquartile range, 99.5-173.4 mL/min); no significant changes were found in group 2. At 4.5 months, ICD, ACD, r-ABI, and p-eABI in group 1 were all significantly better than those in group 2 ($P < .01$). Twelve months' post treatment, walking ability and ABIs in group 1 were not statistically different from those at 4.5 months and remained significantly better than those of control subjects.

Conclusion: Intermittent pneumatic foot compression used at home for 4.5 months increases claudication distance by over 100%. Associated increases in r-ABI by 18%, p-eABI by 110%, and arterial calf inflow by 36% suggest an improved collateral circulation. Maximum benefit seems to be offered over the initial 3 months. Treatment benefits are maintained 1 year after treatment. A multicenter study is indicated to quantify actual benefits and to demonstrate cost effectiveness.