

Enhancing Foot Skin Blood Flux in Peripheral Vascular Disease Using Intermittent Pneumatic Compression: Controlled Study on Claudicants and Grafted Arteriopaths

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Abstract

Intermittent pneumatic leg compression (IPC) increases arterial calf inflow and foot skin blood flux in normal subjects and claudicants. Our hypothesis was the IPC could enhance foot skin blood flux after infrainguinal grafting and thus promote distal perfusion in limbs with tissue loss. The aim of this study was to compare the effects of three IPC modes [applied to the foot (IPC_{foot}), the calf (IPC_{calf}), or both ($IPC_{\text{foot+calf}}$)] on foot skin perfusion in healthy individuals, claudicants, and patients after infrainguinal arterial revascularization performed for critical or subcritical limb ischemia.

Altogether, 20 healthy limbs, 22 claudicating limbs, and 36 limbs of arteriopaths with prior successful autologous femoropopliteal and femorodistal (18 each) grafts were examined. Five-minute laser Doppler recordings were obtained from the pulp of the big toe in the sitting position, at rest and during random applications of IPC_{foot} , IPC_{calf} and $IPC_{\text{foot+calf}}$ delivered at 120mmHg for 4 seconds three times per minute. Foot skin blood flux increased using all IPC modes ($p < 0.001$), with IPC_{foot} and $IPC_{\text{foot+calf}}$ generating higher flux levels than IPC_{calf} ($p < 0.01$) in all groups. Intergroup differences of flux with each of the three IPC modes were not significant. IPC_{foot} and $IPC_{\text{foot+calf}}$ similarly ($p > 0.14$) produced a higher percentage flux increase than IPC_{calf} in all groups ($p < 0.004$). Controls had a higher percentage flux increase with IPC_{calf} and IPC_{foot} than did claudicants ($p < 0.016$). No differences were documented between normal and grafted limbs ($p > 0.05$). The percentage flux increase with $IPC_{\text{foot+calf}}$ and IPC_{calf} was significantly higher in femorodistal grafts than in femoropopliteal ones ($p < 0.026$). IPC enhances skin blood flux in limbs with infrainguinal bypass, claudication, and normal arteries, with IPC_{foot} and $IPC_{\text{foot+calf}}$ being more effective than IPC_{calf} . Our findings suggest that IPC may be beneficial in limbs with impaired distal perfusion and thus may have clinical implications in the treatment of leg ulcers either prior to or after revascularization.