Enchancing Venous Outflow in Lower Limb with Intermittent Pneumatic Compression. A Comparative Haemodynamic Analysis on the Effect of Foot vs. Calf vs. Foot and Calf Compression

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Objectives: intermittent pneumatic compression (IPC), an established method of deep-vein thrombosis prophylaxis, is also an effective means of leg inflow enhancement, improving the walking capacity and ankle pressure of claudicants, long-term. This study, using duplex ultrasonography, compares the haemodynamic effect of IPC of the (a) foot (at 120mmHg [$IPC_{foot/120mmHg}$], and 180mmHg [$IPC_{foot/180mmHg}$]), (b) calf (IPC_{calf}, 120mmHg) and (c) both simultaneously ($IPC_{foot+calf}$, 120mmHg), on the venous outflow of 20 legs of normals and 25 legs of claudicants.

Results: the peak and mean velocities, volume flow and pulsatility index in the superficial femoral and popliteal veins of both groups increased significantly with all IPC modes ($p<0.001$). $IPC_{foot+calf}$ produced the highest enhancement followed by IPC_{calf} ($p<0.01$), which was more effective ($p<0.001$) than either $IPC_{foot/180\ mmHg}$ or $IPC_{foot/120\ mmHg}$. The venous volume expelled with IPC_{calf} and $IPC_{foot+calf}$ was 2-2.5 and 3-3.5 times that with $IPC_{foot/180mmHg}$ respectively. Velocity enhancement with IPC was similar between groups and the superficial femoral and popliteal veins. $IPC_{foot/180\ mmHg}$ produced higher ($p<0.01$) flow velocities than $IPC_{foot/120mmHg}$ in both groups and veins examined; however, differences were limited.

Conclusions: all IPC modes proved effective, $IPC_{foot+calf}$ generating the highest venous outflow enhancement. Higher venous volumes expelled with $IPC_{foot+calf}$ explain its reported superiority on leg inflow over the other modes. Increase of applied pressure from 120 to 180mmHg with IPC_{foot} offered only a small outflow improvement. Venous haemodynamics at rest and with IPC in claudicants do not differ significantly from those in healthy subjects.