

The Acute Effects Of Intermittent Pneumatic Foot versus Calf versus Simultaneous Foot And Calf Compression On Popliteal Artery Hemodynamics: A Comparative Study

*Delis, K.T.; Nicolaidis, A.N.; Labropoulos, N.; and Stansby, G.
Imperial College School of Medicine, St Mary's Hospital, London, UK.*

J Vasc Surg 2000;32:284-92

Introduction: Intermittent pneumatic compression (IPC) is currently being investigated with respect to its effect on distal arterial volume flow in patients with peripheral vascular disease. Recently published data have shown a substantial acute enhancement in arterial calf inflow in response to IPC of the lower limb in both intermittent claudication and leg ischemia.

Purpose: The aim of the study was to compare the immediate effects of intermittent pneumatic foot (IPC_{foot}) versus calf (IPC_{calf}) versus simultaneous foot and calf compression ($IPC_{\text{foot+calf}}$) on popliteal artery hemodynamics in patients with intermittent claudication (Fontaine II) and in normal subjects, using duplex ultrasonography. For this purpose, 25 limbs of 20 healthy subjects (age range [mean], 51-74 [64] years) and 31 limbs of 25 claudicants (age range [mean], 56-81 [66.5] years; resting ankle-brachial indices, 0.38-0.75 [0.55]) were examined in the sitting position with and without IPC compression.

Results: Mean popliteal artery flow in healthy subjects in increased by 98.8% on application of IPC_{foot} , 188% with IPC_{calf} , and 274% with $IPC_{\text{foot+calf}}$ (all $P < .001$). Mean flow in claudicates increased by 58% on application IPC_{foot} , 132% with IPC_{calf} , and 174% with $IPC_{\text{foot+calf}}$ (all $P < .001$). The mean velocity, peak systolic velocity, and end diastolic velocity displayed a pattern of change similar to that for volume flow in both groups. Pulsatility index decreased in both groups on application of IPC; the lowest values were generated with $IPC_{\text{foot+calf}}$.

Conclusions: Of the three compression modes investigated, $IPC_{\text{foot+calf}}$ was the most effective means of acutely augmenting arterial calf inflow in arteriopath and normals. The significant increase in end diastolic velocity and decrease in pulsatility index indicate that peripheral vasodilatation is the central mechanism in this impulse-related flow augmentation. Prospective trails are indicated to determine the clinical potential of the long-term effects of $IPC_{\text{foot+calf}}$ in patients with symptomatic peripheral vascular disease.