

## **Hemodynamic effects of intermittent pneumatic compression in patients with critical limb ischemia**

**Labropoulos, Nicos PhD, DIC, RVT; Leon, Luis R., MD, RVT; Bhatti, Ahmad MD, RVT; Melton, Steven MD; Kang, Steven S., MD; Mansour, Ashraf M., MD; Borge, Marc MD**

*Maywood Ill., Department of Surgery, Loyola University Medical Center*

*J Vasc Surg, Volume 42, Numbers 170-716 (2005)*

**Background:** Traditional teaching assumes that the distal arterial tree is maximally dilated in patients with critical limb ischemia (CLI). Endovascular or arterial bypass procedures are the commonly used interventions to increase distal perfusion. However, other forms of treatment such as spinal cord stimulation or intermittent pneumatic compression (IPC) have been shown to improve limb salvage rates. This prospective study was designed to determine if the use of IPC increases popliteal, gastrocnemial, collateral arterial, and skin blood flow in patients with CLI.

**Methods:** Twenty limbs with CLI in 20 patients (mean age, 74 years) were evaluated with duplex ultrasound scans and laser Doppler fluxmetry in the semi-erect position before, during, and after IPC. One pneumatic cuff was applied on the foot and the other on the calf. The maximum inflation pressure was 120 mm Hg and was applied for 3 seconds at three cycles per minute. All patients had at least two-level disease by arteriography. Fourteen limbs were characterized as inoperable, and six were considered marginal for reconstruction. Flow volumes were measured in the popliteal, medial gastrocnemial, and genicular collateral artery. Skin blood flux was measured on the dorsum of the foot at the same time.

**Results:** Significant flow increase during the application of IPC was found in all three arteries (18/20 limbs) compared with baseline values ( $P < .02$ ). The highest change was seen in the popliteal, followed by the gastrocnemial and the collateral artery. After the cessation of IPC, the flow returned to baseline. This was attributed to the elevation of time average velocity, as the diameter of the arteries remained unchanged. The skin blood flux increased significantly as well ( $P < .03$ ). In two limbs without an increase in the arterial or skin blood flow, significant popliteal vein reflux was found. Both limbs were amputated shortly after.

**Conclusions:** IPC increases axial, muscular, collateral, and skin blood flow in patients with CLI and may be beneficial to those who are not candidates for revascularization. Patients with significant venous reflux may not benefit from IPC. This supports the theory that one of the mechanisms by which IPC enhances flow is by increasing the arteriovenous pressure gradient.