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# Critical Limb Ischemia Successfully Treated by Intermittent Pneumatic Compression

Yoram Moses MD and Boris Yoffe MD FACS

Department of General and Vascular Surgery, Barzilai Medical Center, Ashkelon, Israel  
Affiliated with Faculty of Health Sciences, Ben-Gurion University of the Negev, Beer Sheva, Israel

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Intermittent pneumatic compression is a well-known method for the prevention of deep vein thrombosis and reduction of lymphedema in the lower limbs. Recently however, the concept of using IPC for the treatment of ischemic legs reemerged [1]. This method, which applies impulse compression based on high pressure rapid inflation technology, was found to improve arterial circulation in the lower limbs [2]. We present the case of patient with critical limb ischemia successfully treated by this method.

## Patient Description

A 75 year old man was referred to our outpatient clinic after one year of progressive rest pain in both legs accompanied by edema in his lower legs and non-healing ulcers on his calves. He also suffered from

chronic obstructive pulmonary disease and non-insulin diabetes mellitus. Physical examination revealed: blood pressure 130/59, pulse 90, a systolic heart murmur, absence of pulses in both legs below the groin region, two arterial ulcers on each leg and bilateral edema of the feet. The patient was defined as having critical limb ischemia (Fountain III) and immediate measures were necessary to restore perfusion.

After team consult the patient was considered to be a non-surgical candidate because of the high operative risk. We decided to try the recently introduced IPC device ArtAssist AA-1000e (ACI Medical Inc, San Marcos, CA, USA) that has foot and calf cuffs (known as the IPFCC). A treatment regimen of 3 hours a day in divided sessions was started immediately and the patient continued this mode of therapy for 3 months as an outpatient. We noticed a prominent reduction in his leg edema after

3 days, and the patient felt relief of his rest pain. Three weeks after the treatment was begun the ulcers had healed. Doppler examinations at the end of the 3 months demonstrated a significantly improved ankle-brachial index in both legs compared to the previous Doppler exam [Figure], and there was a favorable change in the pulse volume recording. At the end of 3 months there was a subjective and objective improvement in both legs. We were not able to detect any change in distance walking because the patient's severe COPD prevented prolonged ambulation.

## Comment

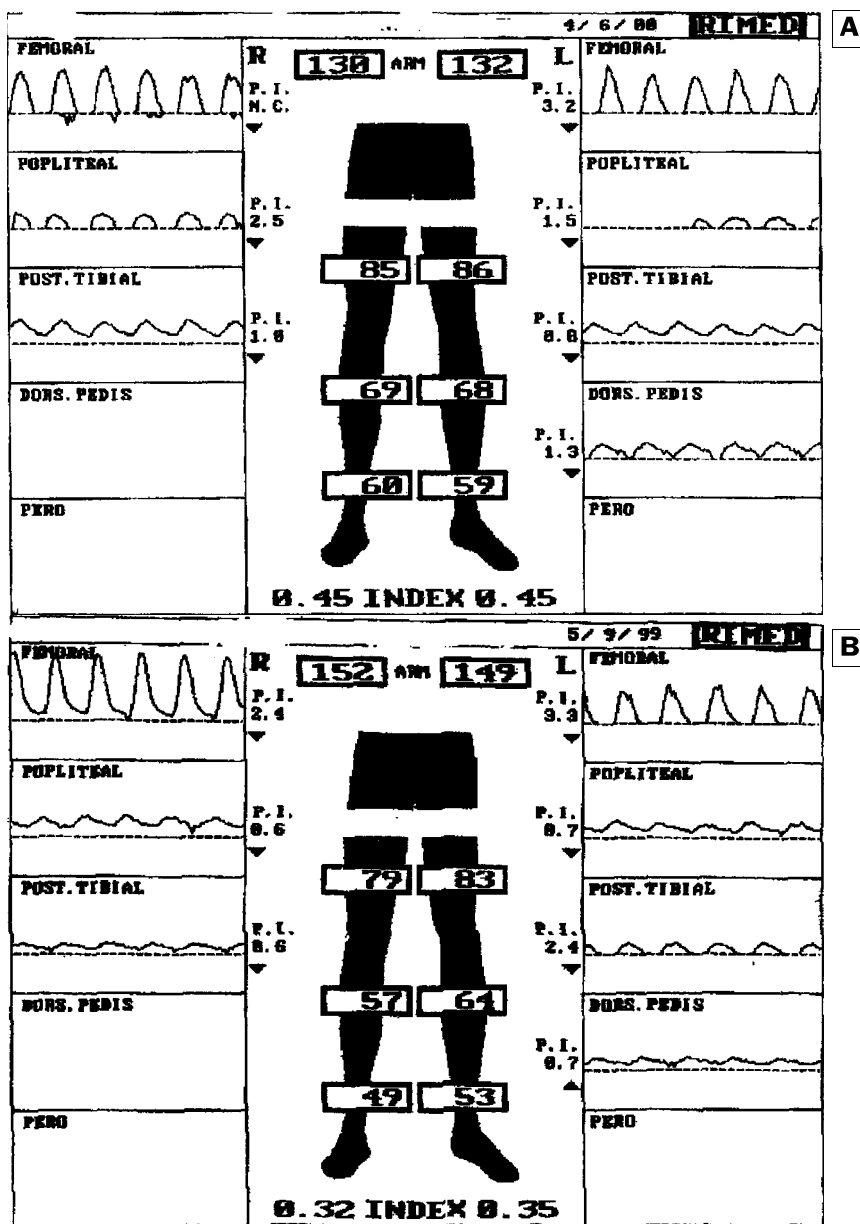
Recently, external pneumatic compression has been shown to significantly aid in the treatment of peripheral occlusive arterial disease. Claudication range has been at

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COPD = chronic obstructive pulmonary disease

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IPC = intermittent pneumatic compression



Doppler results before [A] and after [B] IPC treatment

least doubled, along with demonstrated improvements in ankle-brachial index. During the last decade, extensive research at several academic vascular centers has investigated the potential of this modality in the management of patients with peripheral occlusive arterial disease. Most of the studies assessed the acute effects of IPC on the circulation [3], and their reports showed positive physiologic and hemodynamic changes as well as clinical improvement. A dramatic increase in both skin

perfusion and volumetric arterial blood flow was documented [2]. The mechanism behind these effects suggests an increased arterial-venous pressure gradient due to the drop in venous pressure during compression. Second, the impulse on the endothelial surface leads to release of substances such as nitric oxide, causing vasodilatation effects [5]. In addition, it is postulated that abolition of the veno-arteriolar reflex – a protective mechanism – causes peripheral

vasodilatation by reducing the venous pressure.

It is well known that edema itself is harmful to the tissue perfusion and that reduction of the edema by compression with the other mechanisms mentioned contributes to better vascularization. This kind of technique simulates brisk walking and exercise and finally induces collateral formation. Although there is some knowledge on the long-term effect of IPC on arteriopathy, its precise role in the management of peripheral occlusive arterial disease has not yet been determined.

Accumulating data provided us with the opportunity to use this device in an attempt to restore perfusion to the ischemic legs of the patient described here. To the best of our knowledge this is the first report of resolving such a problem non-surgically. We suggest that this form of therapy may be valuable in accelerating the healing of ulcers, in addition to its use for treating intermittent claudication and rest pain in patients deemed not to be surgical candidates.

## References

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**Correspondence:** Dr. B. Yoffe, Head, Dept. of General and Vascular Surgery, Barzilai Medical Center, Ashkelon 78306, Israel.  
Phone: (972-8) 674-5656  
Fax: (972-8) 674-5719  
email: saref@barzi.health.gov.il