Effect of Intermittent Pneumatic Compression of Foot and Calf on Walking Distance, Hemodynamics, and Quality of Life in Patients with Arterial Claudication

A Prospective Randomized Controlled Study with 1-Year Follow-up

Kostantinos Delis, MD, MS, PhD, FRCSI, EBSQ,vasc* † and Andrew N. Nicolaides, MS, FRCS †

Annals of Surgery Volume 241, Number 3, March 2005

Summary Background Data: Perioperative mortality, graft failure, and angioplasty limitations militate against active intervention for claudication. With the exception of exercise programs, conservative treatments yield modest results. Intermittent pneumatic compression [IPC] of the foot used daily for 3 months enhances the walking ability and pressure indices of claudicants. Although IPC applied to the foot and calf together [IPCfoot+calf] is hemodynamically superior to IPC of the foot, its clinical effects in claudicants remain undetermined.

Objective: This prospective randomized controlled study evaluates the effects of IPCfoot+calf on the walking ability, peripheral hemodynamics, and quality of life [QOL] in patients with arterial claudication.

Methods: Forty-one stable claudicants, meeting stringent inclusion and exclusion criteria, were randomized to receive either IPCfoot+calf and aspirin[75 mg] (Group 1; n = 20), or aspirin[75 mg] alone (Group 2, n = 21), with stratification for diabetes and smoking. Groups matched for age, sex, initial [ICD] and absolute [ACD] claudication distances, pressure indices [ABI], popliteal artery flow, and QOL with the short-form 36 Health Survey Questionnaire (SF-36). IPCfoot+calf(120 mm Hg, inflation 4 seconds x 3 impulses per minute, calf inflate delay 1 second) was used for 5 months, 2.5 hours daily. Both groups were advised to exercise unsupervised. Evaluation of patients, after randomization, included the ICD and ACD, ABI popliteal artery flow with duplex and QOL* at baseline*, 1/12, 2/12, 3/12, 4/12, 5/12, * and 17/12. Logbooks allowed compliance control. Wilcoxon and Mann-Whiney corrected [Bonferroni] tests were used.

Results: At 5/12 median ICD and ACD, resting and postexercise ABI had increased by 197%, 212%, 17%, and 64%, respectively, in Group 1 (P<0.001), but had changed little (P>0.1) in group 2; Group 1 had better ICD, ACD, and resting and postexercise ABI (P < 0.01) than Group 2. Inter- and intragroup popliteal flow differences at 5/12 were small (P > 0.1). QOL had improved significantly in Group 1 but not in Group 2; QOL if the former was better (P < 0.01) than in Group 2. QOL in Group 1 was better (P < 0.01) than in Group 2 at 5/12. IPC was complication free. IPC compliance was (2.5 hours/d) > 82% at 1 month and > 85% at 3 and 5 months. ABI and walking benefits in Group 1 lasted more than a year after cessation of IPC treatment.

Conclusion: IPCfoot+calf emerged as an effective, high-compliance, complication-free method for improving the walking ability and pressure indices in stable claudication, with a durable outcome. These changes were associated with a significant improvement in all aspects of QOL evaluated with the SD-36. Despite some limited benefit noted in some individuals, unsupervised exercise has a nonsignificant impact overall.

From the *Imperial College, Faculty of Medicine, St. Mary’s Hospital, London; and the †Mayo Clinic, Division of Vascular Surgery, Rochester, Minnesota.