A Comparative Study Investigating the Effectiveness of the geko™ medical device versus Intermittent Pneumatic Compression in Enhancing Lower Limb Blood Flow in Healthy Subjects

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Introduction: Mechanical prophylaxis for the prevention of deep vein thrombosis has enjoyed wide popularity, as its use is not associated with the adverse events seen with pharmacological prophylaxis. One of the most commonly used methods of mechanical prophylaxis is intermittent pneumatic compression (IPC). The literature and clinical experience indicates that IPC devices increase lower extremity venous blood flow. A novel medical device (geko™) has been developed. Powered by OnPulse™ technology, the geko™ device activates the muscle pumps of the lower leg by low intensity transcutaneous electrical stimulation of the common peroneal nerve located within the popliteal fossa. **Aims:** This study compared the effectiveness of the geko™ device in enhancing lower limb blood perfusion with two leading IPC devices; the Flowtron® Universal and the Kendall SCD™. Subject's tolerance and acceptability of the devices under study were also compared by the use of visual analogue scales and a verbal rating score. **Methods:** Ten healthy volunteers were recruited in the study. The devices were fitted bilaterally in a sequential manner for a period of thirty minutes, with the subjects lying supine. A recovery period of ten minutes between devices allowed vascular re-equilibration. Vital signs, including blood pressure measurements were performed at each assessment. Corresponding changes in blood flow and volume were also recorded using colour flow duplex ultrasound and laser Doppler fluxmetry (LDF). **Results:** The geko™ device was significantly more effective than the IPC devices in increasing microcirculatory blood flow from baseline ($p \leq 0.001$) when measured by LDF by ~250%. Venous blood flow volume measurements of the geko™ device were significantly higher than either of the IPC systems ($p \leq 0.001$); while venous velocity was equivalent. The use of the geko™ device at a higher setting produced significant augmentation as compared to IPC, in both arterial blood velocity and volume ($p \leq 0.001$). No significant changes in mean vessel diameters, vital signs or blood pressure were found throughout the study ($p \geq 0.05$).When using a visual analogue score index of discomfort, no significant differences were found between the geko™ device and IPC devices ($p \geq 0.05$). **Conclusion:** Results suggest that the technology studied is superior to the IPC systems in increasing lower limb venous blood flow. Further, the geko™ device is superior to IPC devices in increasing arterial and microcirculatory blood flow. The IPC devices and the geko™ device were well tolerated but the latter was more effective in increasing lower limb blood flow.