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Effects of External Calf Compression on Microvascular Oxygenation in the Lower Limb of Young Men

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Compression garments are used in clinical and sports settings to improve blood flow. Pressure applied by the compression garments varies widely with some garments applying as little as 5 mmHg and much as 60 mmHg of pressure. Although compression can increase blood flow, compression to a pressure of 60 mmHg for short periods of time (~30 min) has been shown to cause endothelial damage. This is important because endothelial dysfunction is a precursor of atherosclerosis and may impair microvascular oxygenation. **PURPOSE:** Examine the effect of lower versus higher external compression pressures on microvascular oxygenation in healthy, young men. **METHODS:** Near-infrared spectroscopy (NIRS) was used to measure vastus medialis muscle oxygen saturation (SMO₂) and total hemoglobin (THB) in 29 healthy, young men (22 ± 5 years of age, body mass index 23 ± 2 kg·m⁻²). Oxygenation was measured continuously for 10 min at rest and during external compression, which consisted of inflation of a cuff applied to the calf to 5 mmHg and 60 mmHg in a randomized order. There was a 5 min recovery between conditions. Each compression condition was maintained for 30 minutes. Data were binned into 5 min epochs and analysed using a 2 (condition) x 8 (time points) ANOVA with repeated measures. **RESULTS:** A significant time effect was detected for SMO₂. When comparing the final epoch (min 25-30) to baseline, SMO₂ increased 5.75% and 5.86% with compression to 5mmHg and 60 mmHg, respectively (p<0.001). No condition by time interaction was detected (p=0.89). A significant time effect was detected for THB. When comparing the final epoch (min 25-30) to baseline, THB increased 1.08% and 1.15% with compression to 5 mmHg and 60 mmHg, respectively (p<0.001). No condition by time interaction was detected (p=0.76). **CONCLUSION:** Although previous studies suggest that higher compression pressures of 60 mmHg lead to endothelial dysfunction, our findings suggest that there were no subsequent detrimental effects on microvascular oxygenation. Compression increased microvascular oxygenation and increases were similar between the 5 mmHg and 60 mmHg conditions. These findings suggest that both lower and higher compression pressures may have similar modest beneficial effects on microvascular oxygenation.