Abstract

The Contributions of Arterial and Venous Volumes to Increased Cutaneous Blood Flow during Leg Compression

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Intermittent lower extremity compression increases cutaneous blood flow. The source of this increased perfusion and, the influence of physical activity on stimulated foot skin perfusion has not been elucidated. The purpose of this study is to determine the arterial and venous contributions to augmented cutaneous blood flow during foot and leg compression, and to evaluate whether physical activity influenced the response to compression.

Fifty limbs from 29 normal volunteers were studied in the sitting position. Their daily physical activity was categorized as active if they exercised $\geq$ 3 days/week or sedentary if they exercised $\leq$ 3 days/week. Inflatable foot and calf compression cuffs attached to a timed-pressure pump (ArtAssist® AA-1000, ACI Medical, Inc., San Marcos, CA) were applied to the subject's leg and set to deliver 120 mmHg pressure with a 10-sec deflation cycle. Skin perfusion of the great toe was recorded by a laser Doppler (Laserflo Model BPM 403, TSI, Inc., St. Paul, MN). Total perfusion with compression (A), retrograde venous perfusion (B), and compression artifact (C) was recorded. Mean values for A, B, and C and the differences between the two groups were analyzed using multivariate multiple comparison statistical method. The mean baseline skin perfusion was 3.96 ± 0.91, and mean total stimulated skin perfusion (A) was 9.23 ± 2.13. With arterial inflow obliterated and compression applied, mean skin perfusion (B) was 1.96 ± 0.44. The sedentary group had a mean resting perfusion of 1.64 ± 0.28 and mean stimulated value (A) of 2.29 ± 0.37 ml/min/100 gm tissue. The active group had a mean resting perfusion of 28.26 ± 0.91, and stimulated value (A) of 32.65 ± 4.47 ml/min/100 gm tissue.

These differences in the mean skin perfusion between the two groups were significant. It is concluded that in normals, the majority of increased perfusion is from increased arterial inflow. There is a larger resting foot skin perfusion in active individuals and they have quantitatively greater stimulated inflow compared to sedentary individuals.

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