WHAT HAPPENS ON THE VEINS UNDER COMPRESSION?

Invited commentary

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Two major arguments in favour of the reduction of deep vein diameters under compression

1 – Compression pressure integrally transmitted from the skin to the deep veins using direct intra muscular pressure measurements


2 – Deep vein diameter reduction is demonstrated using MRI in standing position.


Uhl JF. 3D multislice CT to demonstrate the effects of compression therapy. Int Angiol 2010; 29: 411-415
Pressure transmission

Ten legs
five healthy volunteers
(age 60.7 years, BMI 22.4)

US was not used to locate the needle inside the gastrocnemius.

Figure 8. Correlation of IMP vs. IP in standing position (10 healthy legs).
IMP: intramuscular pressure; IP: interface pressure.

The mmHg exerted by cuff are not exactly the same as the mmHg exerted by MCS (Mariotte’s law Vs Laplace’s law)
External pressure is integrally transmitted to the inner parts of the body only in case of liquids. For hard materials the inner pressure is much smaller than the external exerted pressure. The mechanics of soft tissue behavior is between the 2 extreme cases.
Pressure transmission

The intra muscular pressure in Fig 1 is the consequence of the pressure cuff, the depth of the inserted needle and the degree of muscle contraction. The pressure of Fig 2-3 is complying with Laplace’s law.
The first limitation is related to the long static MRI acquisition time for a very limited segment of the calf. As a result, only a small number of slices can be obtained with the patient(s) standing still.
An experiment almost impossible to repeat
Uhl J-F et al: «The first limitation of the three-dimensional MRI modeling of the calf is related to the long static MRI acquisition time».
Ejected volume (mL)

Tip-toe  |  Weight transfer

p < 0.0005

Adapted from Lattimer et al., Phlebology 2017