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

Uhl JF, Begnini JP, Cornu-Thénard A, Fournier J, Blin E. Relationship between medical compression and intramuscular pressure as an explanation of a compression paradox. Phlebology 2015; 30(5): 331-8.

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

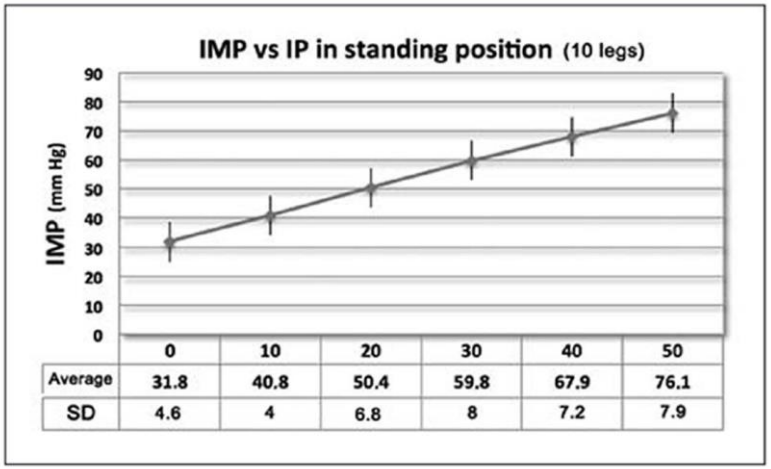
Partsch H, Mosti G, Mosti F. Narrowing of leg veins under compression demonstrated by magnetic resonance imaging (MRI). Int Angiol 2010; 29: 408-10.

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

1 Pressure transmission

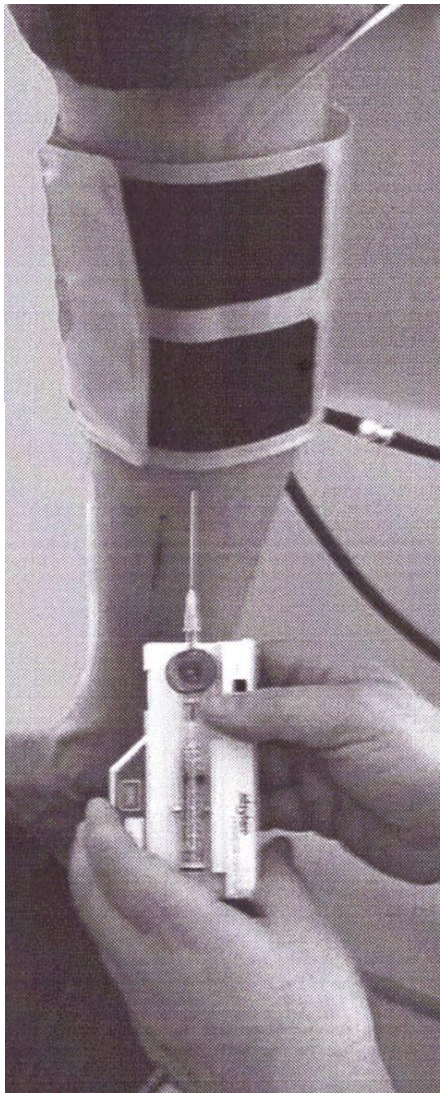
Ten legs
five healthy volunteers
(age 60.7 years, BMI 22.4)

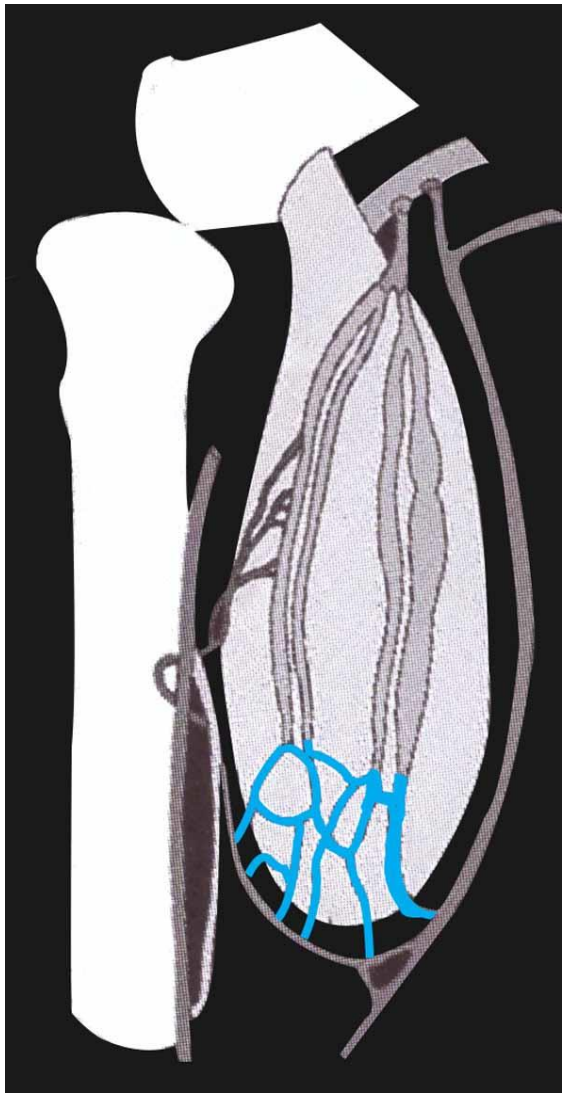
US was not used to locate the needle inside the gastrocnemius.



	0	10	20	30	40	50
Average	31.8	40.8	50.4	59.8	67.9	76.1
SD	4.6	4	6.8	8	7.2	7.9

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



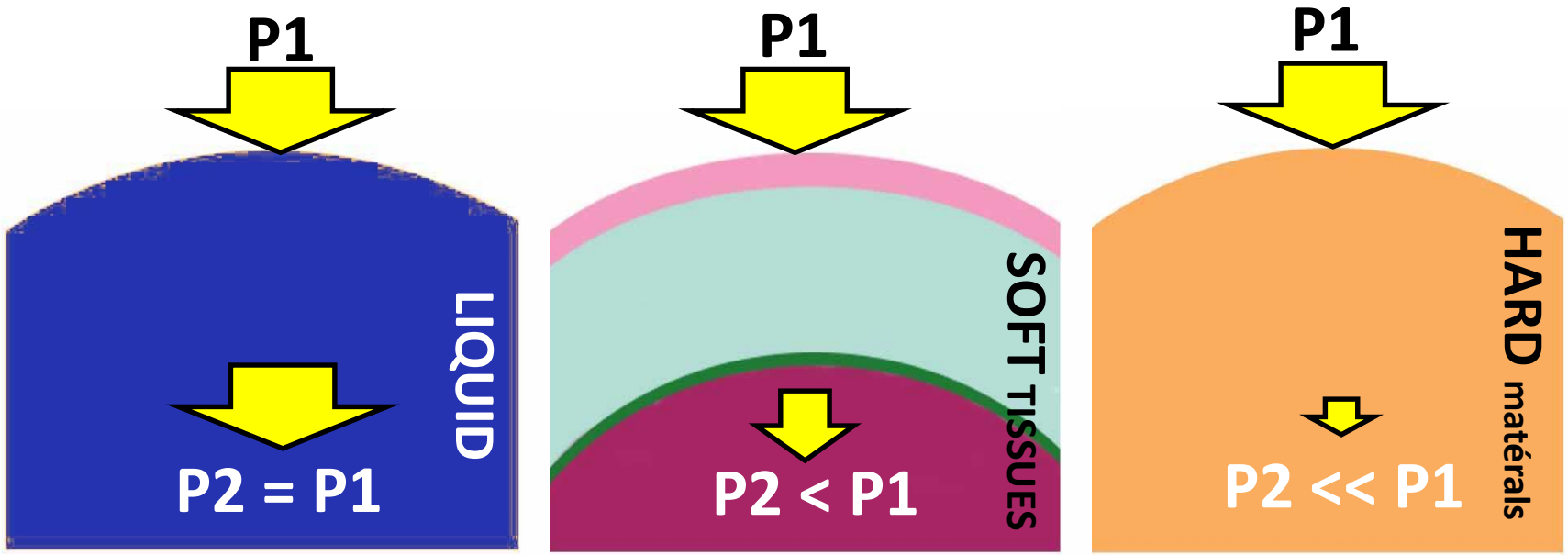


Adapted from Gillot,

The mmHg exterted by cuff are not exactly the same as the mmHg exerted by MCS
(Mariotte's law Vs Laplace 's law)

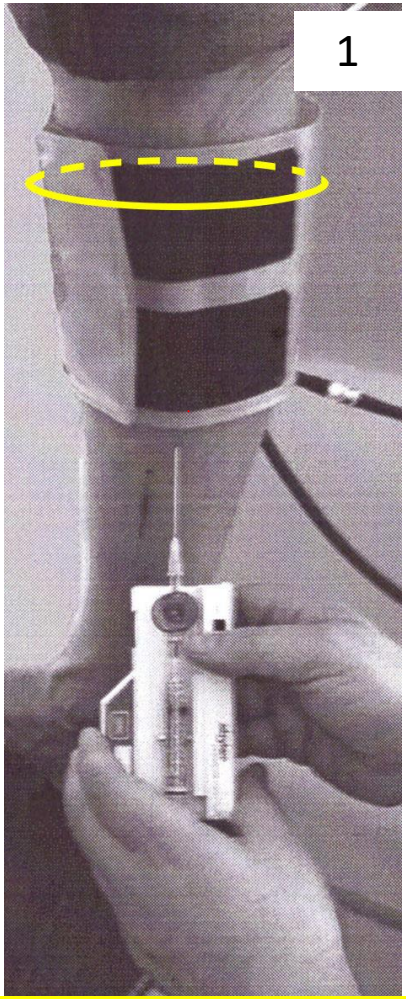
1 Pressure transmission

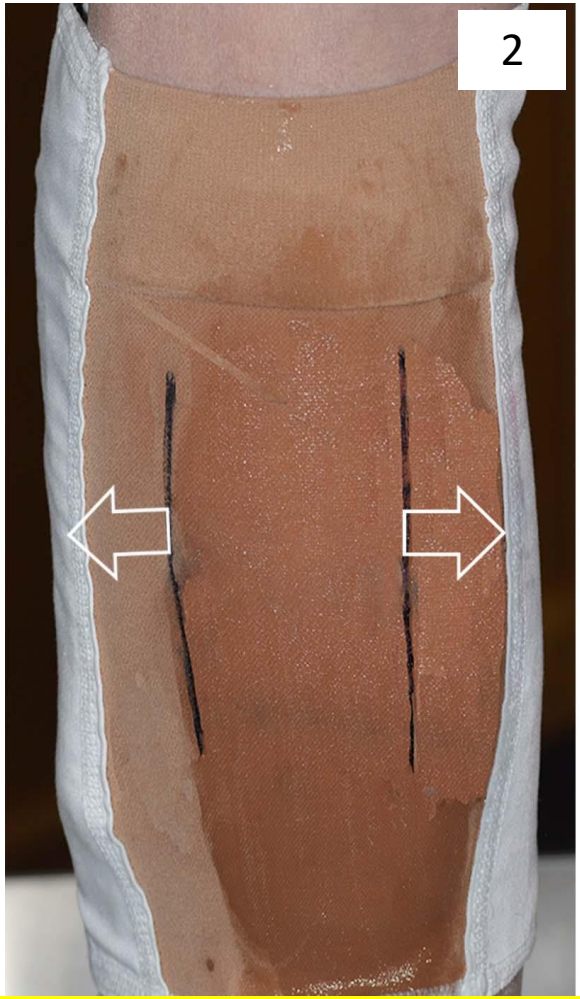
Von Mises' laws



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.

1 Pressure transmission

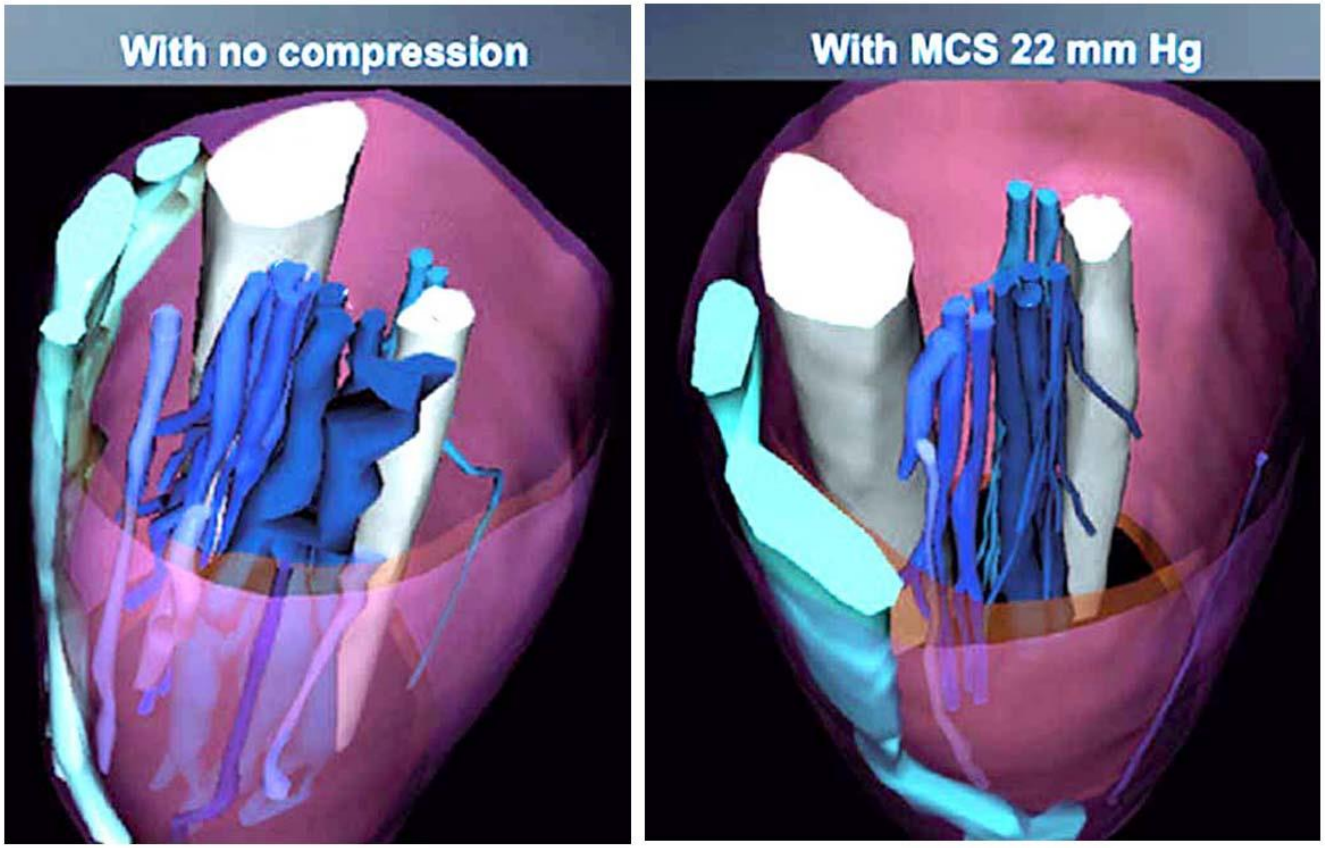




The intra msucular pressure in Fig 1 is the consequence of the pressure cuff, the depth of the inserted needle and the degree of muscle contraction
The pressure of Fig 2-3 is complying with Laplace's law.

2 MRI in standing position

Uhl J-F et al. : « 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. »



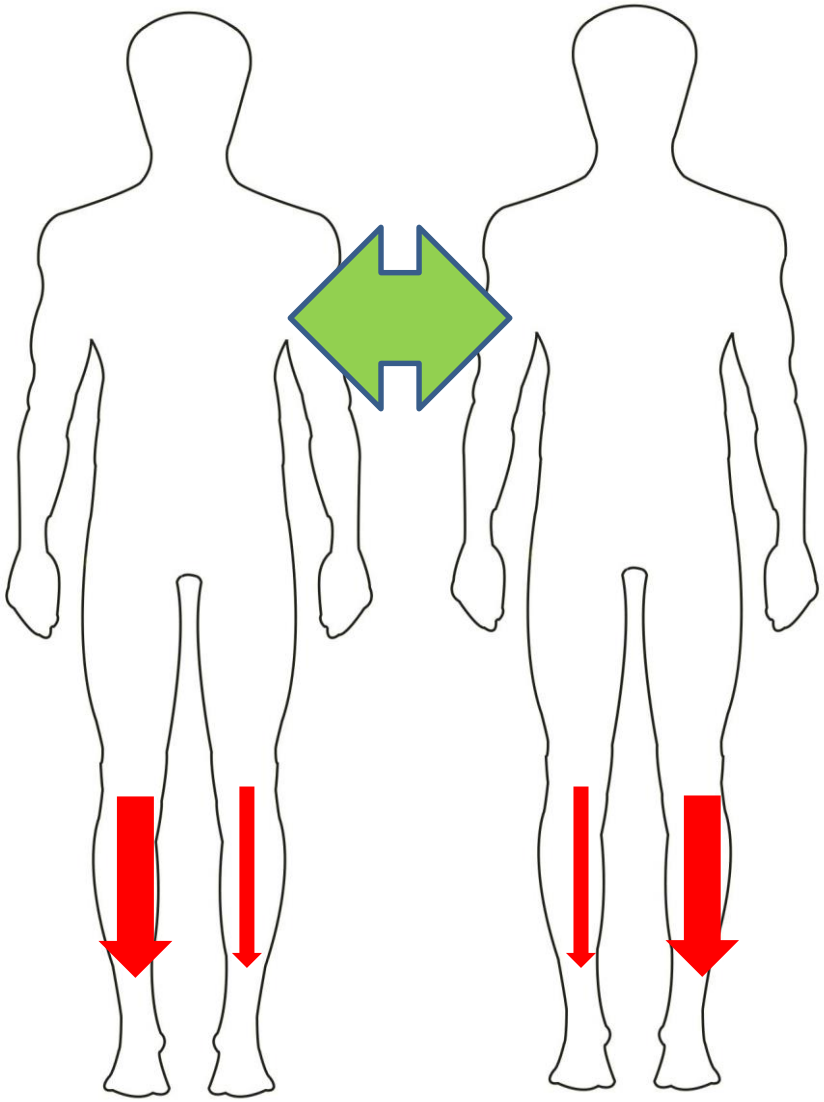
From Uhl et al. Phlebology 2015

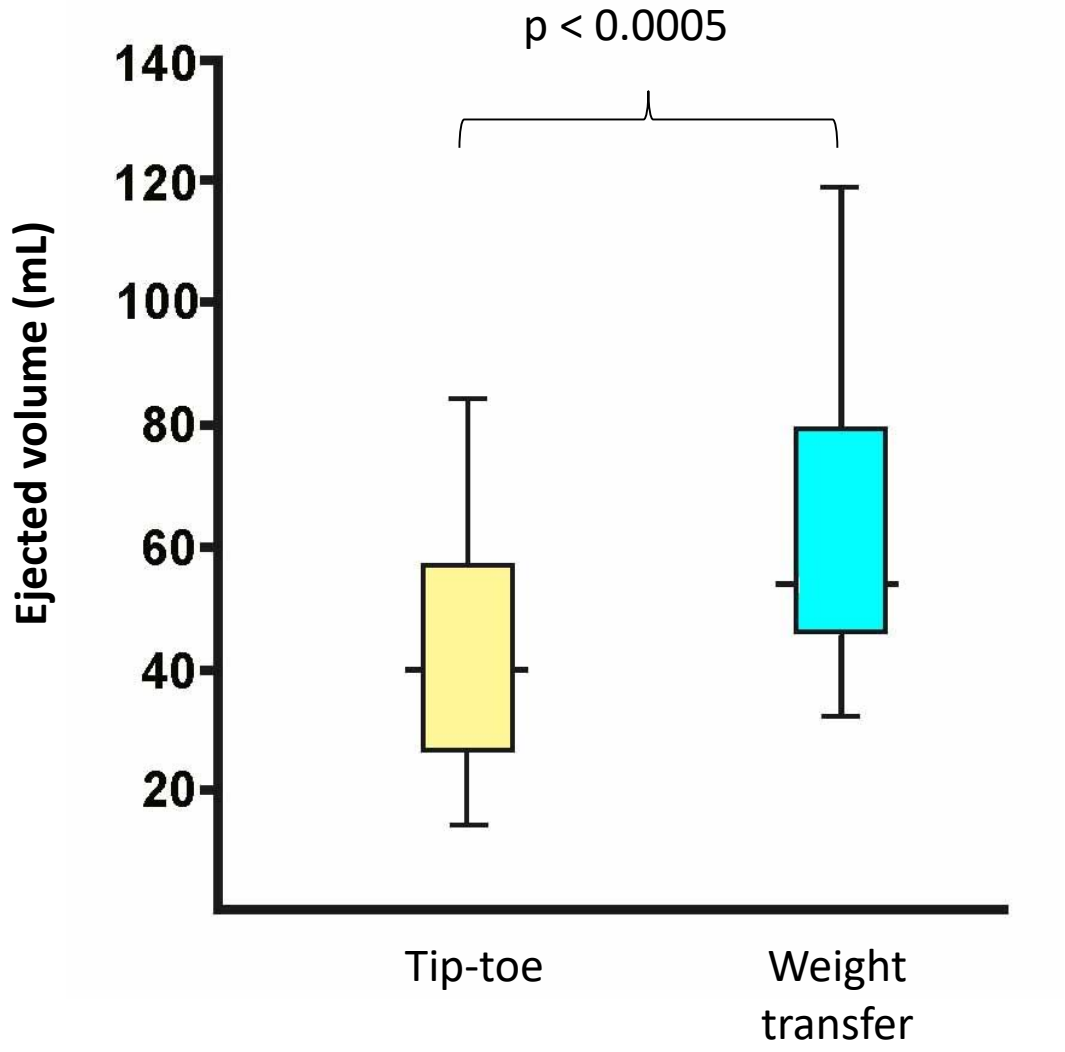
2 MRI in standing position

An experiment almost impossible to repeat

2 MRI in standing position

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».





Adapted from Lattimer et al., Phlebology 2017

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International Compression Club