

Is compression improving vein symptoms through inflammation regulation?

Igor Zolotukhin

Pirogov Russian National Research Medical University,
Moscow, Russia

Disclosure

- Speaker's travel expenses and accomodation costs were covered by Center of Interdisciplinary Research on Compression

Conclusions

- No
- ... but, yes

.... is compression
improving leg symptoms?



No doubt there...

Compression and venous symptoms

Study	Population Treatment duration	Pressure (mmHg)	End-points (symptoms assessed)	Conclusion
Blattler et al., 2008	Healthy (C0) 3w	4-9 12-18 18-22	Set of symptoms Set of symptoms Set of symptoms	Not improved Improved Improved
Blazek et al., 2013	Hairdressers (C0-2) 3w	15-20	Pain Sensation of swelling	Improved Improved
Schul et al., 2011	C1 6w	20-30	Aching Pain Cramping Sensation of swelling Restlessness	Improved Improved Improved Not improved Improved
Couzan et al., 2009	C0-C2 2w	14 to 20 20 to 7	Fatigue Fatigue	Improved Improved

Compression and venous symptoms

It works...

.... why does it work the same
in so different patients?



Compression alleviates
symptoms in:

C2

C1

C0

Symptomatic venous patients

	C2S	C1S	C0S
Varicose veins	Yes	No	No
Spider veins / TAE	+/-	Yes	No
Reflux	Yes	No	No

Symptomatic venous patients

C2S

C1S

C0S

... all patients have the same symptoms like pain, heaviness, fatigue, sensation of swelling etc. ...

Spider Veins / IAL + / - Yes No

Reflux

Yes

No

No

Symptomatic venous patients

- What is common for them?

Symptoms develop after
some hours of orthostasis

What standing/sitting leads to?

Leg volume increases immediately!

+ 1.6-2.5% in 10 min
(100-150 ml)

Stick C, Hiedl U, Witzleb E. Volume changes in the lower leg during quiet standing and cycling exercise at different ambient temperatures. *Eur J Appl Physiol* 1993;66:427-33.
Pannier F, Rabe E. Optoelectric volume measurements to demonstrate volume changes in the lower extremities during orthostasis. *Int Angiol* 2010;29:395-400.

What diurnal orthostasis leads to?

CVD patient with standing occupation



morning

+ 80 mL



evening

How's volume connected to symptoms

Do degree of volume increase depends on CVD severity?



Yes



How's volume connected to symptoms

Do symptoms relate to degree of volume increase?



Yes, for pain and tiredness, but slightly



How's volume connected to symptoms

Why symptoms not develop
in many CVD patients?



May be because volume does
not increase in every patient



How's volume connected to symptoms



40% of legs with CVD had normal or even decreased leg volume in the evening



How's volume connected to symptoms



60% of legs with CVD
had leg volume increased
in the evening



The more severe CVD is,
the higher volume increase is observed

How's volume connected to symptoms

60% legs with CVD
have venous symptoms

The more severe CVD is,
the higher number of symptoms is observed

Vuylsteke ME, Colman R, Thomis S, Guillaume G, Degrande E, Staelens I. The influence of age and gender on venous symptomatology. An epidemiological survey in Belgium and Luxembourg. *Phlebology*. 2016;31(5):325-333

Wrona M, Jöckel KH, Pannier F, et al. Association of Venous Disorders with Leg Symptoms: Results from the Bonn Vein Study 1. *Eur J Vasc Endovasc Surg*. 2015; 50: 360-3677

Zolotukhin IA, Seliverstov EI, Shevtsov YN et al. Risk factors for venous symptoms in Russian patients with chronic venous disease. *Curr Med Res Opin* 2019; 35(9): 1583-7

How's volume connected to symptoms

It seems that extra volume
triggers venous symptoms

Vuylsteke ME, Colman R, Thomis S, Guillaume G, Degrande E, Staelens I. The influence of age and gender on venous symptomatology. An epidemiological survey in Belgium and Luxembourg. *Phlebology*. 2016;31(5):325-333

Wrona M, Jöckel KH, Pannier F, et al. Association of Venous Disorders with Leg Symptoms: Results from the Bonn Vein Study 1. *Eur J Vasc Endovasc Surg*. 2015; 50: 360-3677

Zolotukhin IA, Seliverstov EI, Shevtsov YN et al. Risk factors for venous symptoms in Russian patients with chronic venous disease. *Curr Med Res Opin* 2019; 35(9): 1583-7

What makes volume decreased?

Do walking makes volume decreased?



Yes, but we don't usually walk the whole day

Do walking makes volume decreased?

In golfers, having finished 18-hole game
(3 to 4 hours), calf volume increased by 5%

What makes volume decreased?

In golfers, having finished 18-hole game (3 to 4 hours), calf volume increased by 5%

In golfers, having finished 18-hole game while wore 23 mmHg stockings, calf volume decreased by 4%

Wearing of compression stockings led to less fatigue

.... compression reduces extra volume. But, what it has to do with inflammation ...?



Where this extra volume hides?

- Extracellular space
- Venous system itself:
vein calibers are bigger in the evenings*

Increased volume and inflammation: how are they can be connected?

↑ vein calibers after prolonged orthostasis



↓ velocity



shear stress alteration



expression of adhesion molecules on the endothelium



leukocytes trapping and migration into venous wall



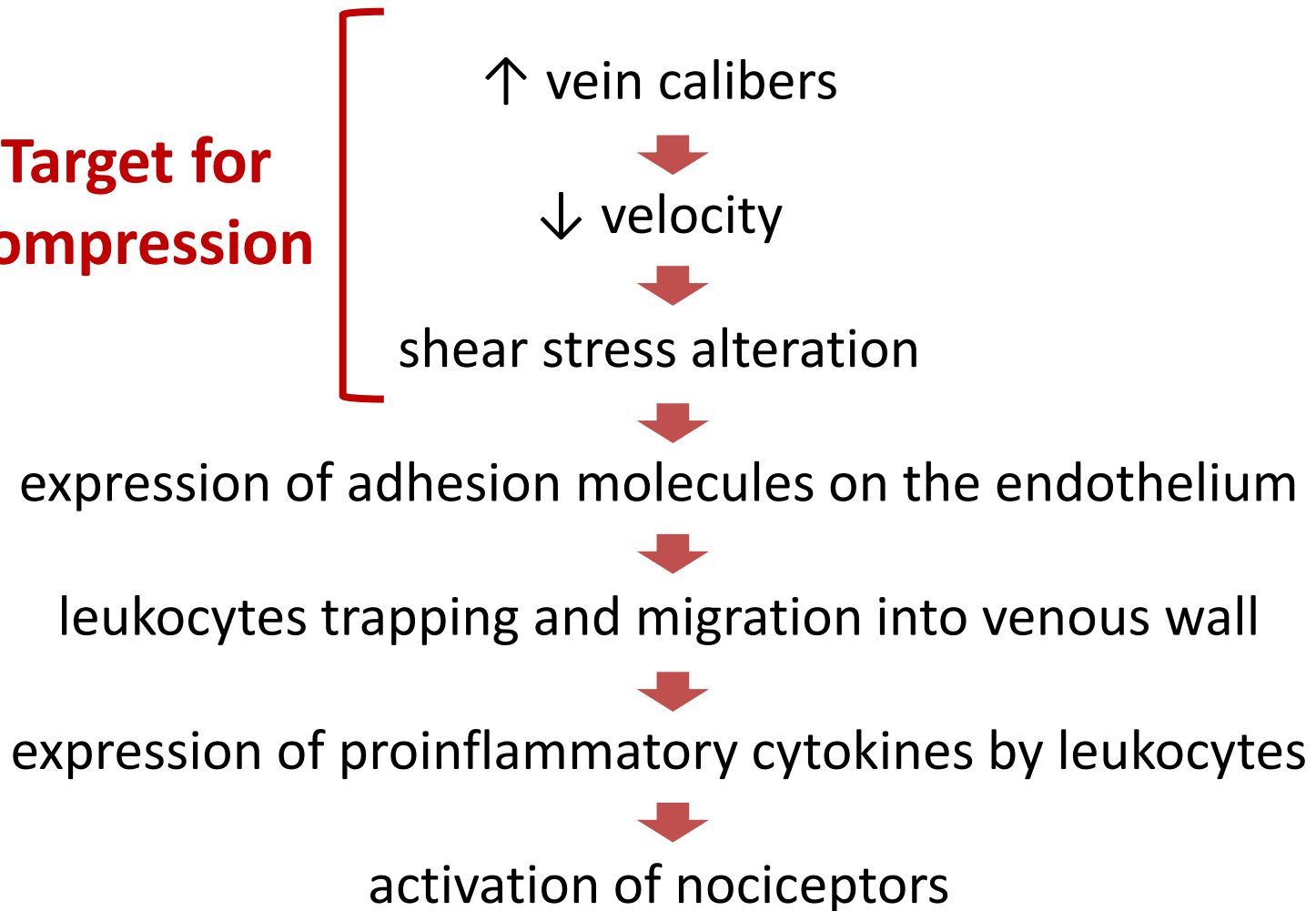
expression of proinflammatory cytokines by leukocytes



activation of nociceptors

Increased volume and inflammation: how are they can be connected?

**Target for
compression**



Is compression improving vein symptoms through inflammation regulation?

Yes, but ...
not in direct way