Superiority of short-stretch bandages to improve venous pumping function

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Introduction:

In chronic venous insufficiency (CVI) ejected volume (EV) and ejection fraction (EF) are reduced. Compression therapy aims to improve haemodynamic impairment.

Aim:

…to study the influence of elastic* and inelastic** bandages on the venous pumping function in patients with severe venous incompetence.

Material and Methods

Ejection fraction (EF) as a very meaningful parameter characterizing venous pumping function was measured in 30 patients affected by severe venous reflux in the great saphenous vein (CEAP C2-C5) and in 15 healthy volunteers as a control. Long-stretch* and short-stretch** (cohesive) on top of a padding layer*** were used as models for elastic and inelastic bandages (multilayer, multi-component system). Both types of bandages were applied with different stretch in order to exert a comparable supine and standing pressure. The interface pressure was measured continuously during the test (PicoPress®, b1-point; Fig. 1). In a second series measurements were repeated after wearing the bandages for one week.

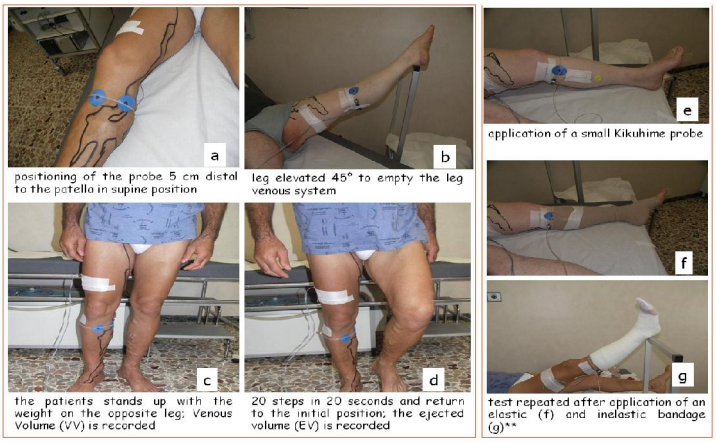

Fig. 1: Methods step by step

Tab. 1: EV, EF and pressure in lying and standing position; SSI, diastolic and systolic pressure during walking; walking pressure amplitudes (WPA) at baseline and after application of elastic and inelastic bandage. Elastic bandages are applied with the same supine and standing pressure as inelastic. Values are expressed as medians.

	EV	EF	supine pressure	standing pressure	SSI	diastolic pressure	systolic pressure	WPA
healthy volunteers	*3*	*65,00*						
baseline (CVI)	1,61	33,10						
elastic	1,87	43,00	42	46	4	41.5	45	3,5
elastic high stretch	2,24	45,10	58	63	5	59	64	5
inelastic	3,61	62,70	41,5	62	20,5	42	64	22

Results

Short stretch compression increases ejection fraction significantly more than elastic bandages being applied with the same resting pressure (Tab. 1; Fig. 2). If we apply elastic bandages with high stretch (fig 2b, “el. stretch”, orange) in order to achieve a standing pressure comparable with that of inelastic bandages, this is hardly tolerated and induces only a minimal increase of the ejection fraction. The improvement of ejection fraction correlates significantly with the working pressure and with the pressure amplitudes during exercise. These pressure amplitudes characterize the so-called massaging effect of a bandage. After wearing bandages for one week it could be demonstrated that hemodynamic effects were still maintained.

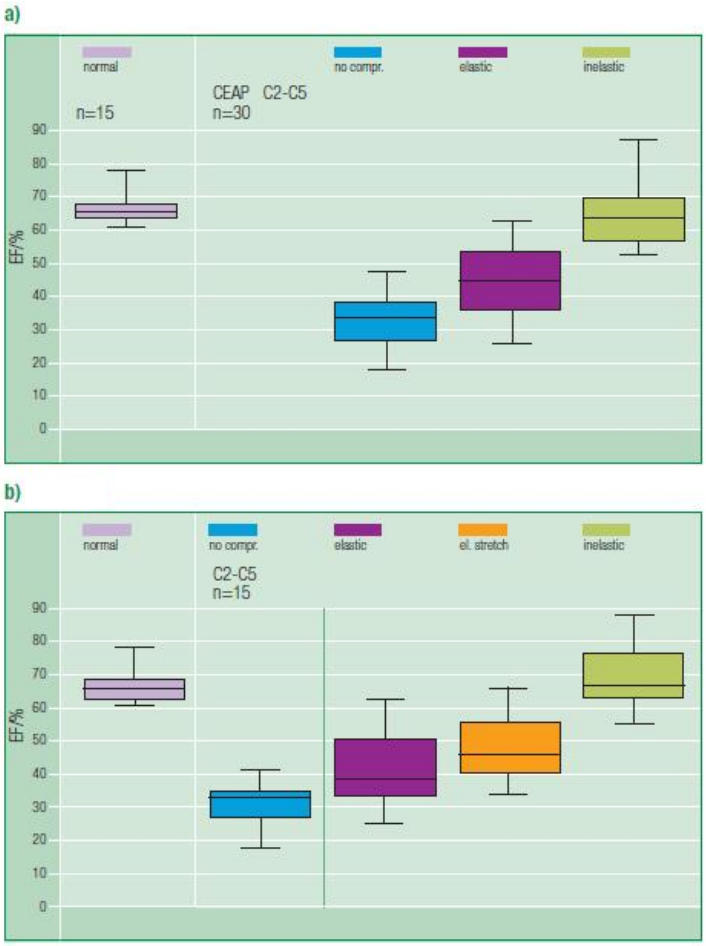

Fig. 2: a) Ejection fraction with comparable supine pressure (40 mmHg).
b) Ejection fraction with comparable standing pressure (64 mmHg; “el. stretch”, orange)

Applied with the same resting pressure, inelastic but not elastic material is able to normalize venous pumping function. Elastic material is not able normalize venous pumping function neither when applied with the full stretch (“el. stretch”, orange) in order to get a high standing pressure .

Conclusion

Short stretch bandages applied with the supine pressure of 40 mmHg (arising to 64 mmHg in standing position) are able to normalize venous pumping function. Elastic material is unable to increase significantly the venous pumping function nor when applied with the same supine pressure (Fig. 2a) or with the same standing pressure (Fig. 2b).

Reference: Mosti G, Mattaliano V, Partsch H. Phlebology (2008) 23: 287-294

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***Dauerbinde®K; **Mollelast®haft, ***Cellona® padding layer, Lohmann & Rauscher**

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