pagepress

Self-management by firm, non-elastic adjustable compression wrap device

[Translation of Druckmessungen unter Klettverschluss-Kompression - Selbstbehandlung durch feste, unelastische Beinwickelung]

Giovanni Mosti,[1] Hugo Partsch[2]

[1]Angiology Department, MD Barbantini Clinic, Lucca, Italy; [2]Professor Emeritus, Medical University of Vienna, Austria

Abstract

Severe forms of chronic venous insufficiency and lymphedema require strong compression-pressure, which exceeds the pressure exerted by medical compression stockings (>40 mmHg). The aim was to investigate if patients are able to apply a Velcro-band compression device (Circaid Juxta Lite™) themselves with sufficient pressure. Thirty-one patients (CEAP C6=23, C5=5, C3=2, mixed ulcer=1) applied Juxta Lite™ on their own legs after a short instruction and were asked to readjust the pressure by their subjective feeling. Sub- bandage pressure was measured after application and 24 h later. In 30 patients without arterial occlusive disease the median sub- bandage pressure values on day 1 and day 2 were 44,5 mmHg (IQR 42-48), and 46 mmHg (IQR 44-48,25) respectively. One patient with an arterial-venous leg ulcer showed pressures of 34 and 36 mmHg. All measured pressure values corresponded to the pursued target range, demonstrating that adequate self application of Velcro bands is feasible and that patents can maintain this pressure by re-adjustment.

Introduction

Compression therapy is still the most important basic treatment modality for phlebological and lymphological diseases, mainly performed with medical compression stockings or with bandages.

Compression stockings are available in different compression classes, which are categorized following the German RAL regulation into pressure class I (18-21 mmHg), class II (23-32 mmHg), class III (34-46 mmHg) and class IV (more than 49 mmHg).[1] Following an analysis from Horst Gerlach 93% of compression stockings prescribed in Germany belong to class II, very few to class III and never to class IV.[2] In France, most of prescriptions are stockings in a pressure range of lower than 20 mmHg, which is sufficient for patients with symptomatic varicose veins.[3]

With higher compression pressure, there is a decreasing compliance of wearing the stockings in daily practice. Especially elder patients need nursing service for donning the stockings in the morning and for doffing them in the evening, which is certainly not cost-effective.

More severe forms of chronic venous insufficiency (C4-C6) and lymphedema need bandages with higher pressures.

Compression bandages can be differentiated into elastic bandages (maximal extensibility >100%) and inelastic materials (maximal stretch <100%). Modern multicomponent bandages act like inelastic bandages, due to the friction between the layers and to the use of adhesive surfaces.[4]

Various investigations have shown, that in the upright position pressures on the leg are required, which exceed 60 mmHg to narrow the veins and to achieve a hemodynamic effect regarding a reduction of venous reflux and of ambulatory venous hypertension.[5,6]

Such high pressures can only be achieved by using inelastic material. Inelastic material, applied with a resting pressure of 50 mmHg induces an increase of compression pressure by more than 10 mmHg by standing up and pressure peaks over 70 mmHg during walking. This can mainly be explained by the increase of leg diameter and of the consistency of the muscles.[7]

Therefore, such strong pressure bandages are used for treating severe forms of chronic venous insufficiency and for the initial phase of lymphedema.

There are two main disadvantages of such bandages: proper application[8] and pressure loss.[9]

Inelastic bandages using Velcro hook and loop fastener (Figure 1), which can be applied by the patients themselves and can be readjusted, could solve these problems.

Aim of this paper is assessing if patients are able to apply inelastic Velcro devices themselves and if the pressure can be maintained by self-adaptation.

Materials and Methods

Patients

In a total of 31 patients (13 men and 18 women, age between 40 und 81 years, mean age 65.5 years) interface pressure was measured under Velcro devices (Juxta Lite™), which had been self-applied after short demonstration: 23 patients had a venous ulcer (CEAP C 6), in 5 the ulcer was healed (CEAP C5), 2 suffered from venous edema (CEAP C3) and one patient had a mixed arterial-venous ulcer.

All patients had experience with previous compression bandages (Rosidal sys©), partly also with compression stockings.

Application of Juxta Lite™

After theoretical information, a fitting model of Juxta Lite™ was selected and patients were invited to apply these models to their own legs where the pressure was measured. Patients were asked to leave the Velcro bands overnight unless it was painful and to readjust them when needed. They were told that the pressure should be tight but not painful. In case of doubt they should measure the pressure using the measuring card or to stretch more the bands if they would be too loose or to loosen them if they would be too tight. After 24 h patients were invited to come back and the pressure was checked again.

Measurement of compression pressure

This was done using Picopress® (MicrolabItalia, Padua, Italy), which had been attached to the B1 point (transition of the tendinous to the muscular part of the medial gastrocnemius muscle) and stayed there up to the second measurement after 24 hours.[10]

Correspondence: Giovanni Mosti, Clinica MD Barbantini, via del Calcio 2, 55100 Lucca, Italy. Fax: +39.0583.490050.
E-mail: giovanni.mosti10@gmail.com

Key words: Compression therapy; Velcro-bands; compression pressure; self-management.

Source: this paper is an abridged translation of Mosti G, Partsch H. Druckmessungen unter Klettverschluss-Kompression - Selbstbehandlung durch feste, unelastische Beinwickelung. Vasomed 2017;5:212-6.

Received for publication: 10 August 2017.
Accepted for publication: 24 August 2017.

This work is licensed under a Creative Commons Attribution 4.0 License (by-nc 4.0).

©Copyright G. Mosti and H. Partsch 2017
Licensee PAGEPress, Italy
Veins and Lymphatics 2017; 6:7003
doi:10.4081/vl.2017.7003

Non-commercial use only

OPEN ACCESS

Results

The median pressure values at day 1 after self-application of the Velcro device was 44.5 mmHg (IQR 42-48) and 46 mmHg (IQR 44-48,25) after 24 h (Figure 2).

The slightly higher values after 24 h can be explained by the re-adjustment by the patients. No patient removed the compression overnight.

The patient with the mixed arterial-venous ulcer was instructed to use the measuring card and to avoid pressures higher than 40 mmHg.[11] He applied the system with a pressure of 34 mmHg, which was comfortable for him. There were no problems during the night and he came back with a pressure readjusted to 36 mmHg on the next day.

Discussion

In a consensus conference on compression bandages the following pressure ranges were defined (Table 1).[4]

Various investigations have demonstrated that inelastic compression in a range of more than 40 mmHg has more intensive effects on the venous hemodynamics in patients without arterial occlusions.[12-14] In contrast to elastic material these pressures are well tolerated as *firm, but not painful*.

An essential drawback of inelastic bandages is the fact that application needs to be learned and trained, and that most bandages are applied with too low pressure.

K. Protz and coworkers have shown that in training courses 424 out of 551 bandages (77%) were applied too loosely (median pressure around 30 mmHg), and that only 51 (10%) reached the required target range of 50-60 mmHg.[8] Similar results were also reported in a study from Denmark.[15]

As shown in the presented study, patients can self-apply Velcro bandages in the Juxta-Fit™ firm pressure range after short instruction. These findings agree with a previous study in which median pressures of 53 mmHg (IQR 39-59) were measured if Juxta fit was applied by trained staff, and 52 mmHg IQR (46-61), if patients did it 2 h later themselves.[16]

The reported results also demonstrate that the pressures are maintained by self-readjustment. This contrasts with inelastic bandages which are losing pressure considerably already after some hours. This fact also explains the more pronounced edema reduction of Velcro-devices *versus* inelastic bandages in lymphedema patients.[17]

Only few studies are available up to now concerning the clinical efficacy of Velcro systems.[18]

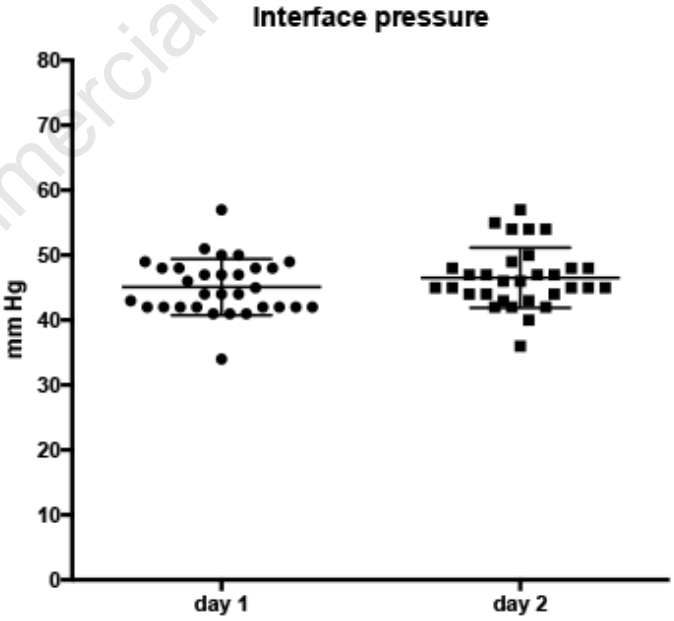
The presented study should show that self-management using such devices is feasible and promising.

Conclusions

Velcro-bands, which are new on the European market, provide two advantages in comparison with compression bandages:

- They can be self applied by the patients revealing an inelastic compression which

Figure 1. The non elastic adjustable compression wrap device.



	day 1	day 2
Minimum	34.00	36.00
25% Percentile	42.00	44.00
Median	44.00	46.00
75% Percentile	48.00	48.00
Maximum	57.00	57.00
Mean	45.10	46.52
Std. Deviation	4.316	4.639

Figure 2. Pressures under Juxta fit in 30 patients without arterial problems.

Table 1. Classification of compression bandages.[4]

Resting pressure at B1 (mm Hg)	Description
<20	Mild
20-40	Moderate
40-60	Strong
>60	Very strong

Non commercial use only

is more effective compared to an inelastic bandage applied by medical staff. The instructed patient feels the pressure range he needs. This pressure can additionally be checked by the pressure measuring aid.

- When the system loses pressure, this can be readjusted using the pressure card or just by patient`s feeling. This contrasts with conventional bandages showing a considerable pressure loss in short time so that they need to be renewed.

The Velcro-system is an ideal instrument for self-management, which can decease nursing costs as this was demonstrated in a recommendation from the British health authorities NICE.[19]

References

1. Wienert H, Gerlach H, Gallenkemper G, et al. Leitlinie Medizinischer Kompressionsstrumpf (MKS) Phlebologie 2006;6:315-20.
2. Gerlach H, Amsler F. Geschlechtsspezifische Unterschiede bei der Verordnung von medizinischen Kompressionsstrümpfen. Vasomed 2014;26:2-8.
3. Reich-Schupke S, Protz K, Dissemond J, Rabe E. new developments in compression treatment. Dtsch Med Wochenschr 2017;142:679-86.
4. Partsch H, Clark M, Mosti G, et al. Classification of compression bandages: practical aspects. Dermatol Surg 2008;34:600-9.
5. Partsch B, Partsch H. Calf compression pressure required to achieve venous closure from supine to standing positions. J Vasc Surg 2005;42:734-8.
6. Partsch H, Mosti G, Mosti F. Narrowing of leg veins under compression demonstrated by magnetic resonance imaging (MRI). Int Angiol 2010;29:408-10.
7. Hirai M, Koyama A, Miyazaki K, et al. Interface pressure and stiffness in different combinations of compression material. Phlebology 2012;27:82-9.
8. Protz K, Heyer K, Dörler M, et al. Compression therapy: scientific background and practical applications. J Dtsch Dermatol Ges 2014;12:794-801.
9. Protz K, Heyer K, Verheyen-Cronau I, Augustin M. Loss of interface pressure in various compression bandage systems over seven days. Dermatology 2014;229:343-52.
10. Partsch H, Mosti G. Comparison of three portable instruments to measure compression pressure. Int Angiol 2010;29:426-30.
11. Mosti G, Iabichella ML, Partsch H. Compression therapy in mixed ulcers increases venous output and arterial perfusion. J Vasc Surg 2012;55:122-8.
12. Partsch H. Improving the venous pumping function in chronic venous insufficiency by compression as dependent on pressure and material. Vasa 1984;13:58-64.
13. Mosti G, Mattaliano V, Partsch H. Inelastic compression increases venous ejection fraction more than elastic bandages in patients with superficial venous reflux. Phlebology 2008;23:287-94.
14. Partsch H, Menzinger G, Mostbeck A. Inelastic leg compression is more effective to reduce deep venous refluxes than elastic bandages. Dermatol Surg 1999 ;25:695-700.
15. Zarchi K, Jemec GB. Delivery of compression therapy for venous leg ulcers. JAMA Dermatol 2014;150:730-6.
16. Damstra RJ, Partsch H. Prospective, randomized, controlled trial comparing the effectiveness of adjustable compression Velcro wraps versus inelastic multicomponent compression bandages in the initial treatment of leg lymphedema. J Vasc Surg Venous Lymphat Disord 2013;1:13-9.
17. Mosti G, Cavezzi A, Partsch H, et al. Adjustable Velcro compression devices are more effective than inelastic bandages in reducing venous edema in the initial treatment phase: a randomized controlled trial. Eur J Vasc Endovasc Surg 2015;50:368-74.
18. Williams A. A review of the evidence for adjustable compression wrap devices. J Wound Care 2016;25:242-7.
19. National Institute for Health and Care Excellence (NICE). The Juxta CURES adjustable compression system for treating venous leg ulcers. Available from: https://www.nice.org.uk/ advice/ mib25/chapter/technology-overview

Non commercial use only