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COMPRESSION BULLETIN

Robert Stemmer Library on Compression Therapy

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  In 20 patients with severe reflux in the great saphenous vein, all of them candidates for surgery, venous pumping function was assessed by measuring ejection fraction of the calf pump using strain-gauge plethysmography.
- **Thigh compression after great saphenous surgery is more effective with high pressure**
  54 patients undergoing invagination stripping of the great saphenous vein and side branch evulsion under local anaesthesia were treated postoperatively in sequential order by A) thigh length compression stockings, B) adhesive bandages and C) newly developed eccentric compression pads fixed with tapes together with a thigh length stocking on top.
- **Inelastic bandages maintain their hemodynamic effectiveness over time despite significant pressure loss**
  In 18 patients presenting with bilateral reflux in the great saphenous vein (CEAP C3-C5) ejection fraction (EF) of the calf pump was measured without compression and immediately after application of an inelastic bandage on one leg and Sigvaris Ulcer X on the other leg.
- **The impact of intermittent pneumatic compression devices on deep venous flow velocity in patients with congestive heart failure**
  Flow velocities of popliteal and soleal veins were recorded in 19 patients with CHF and in 19 control subjects using a high-resolution linear probe.

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- Handbook „Compression Therapy of the extremities", edited by Robert Stemmer in 1999 continuous literature updates, which are regular amendments of the handbook.
- The Compression Bulletin reports about important new publications.
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  8. Bandages
  9. Compression stockings
  10. Compression & mobilization strategies

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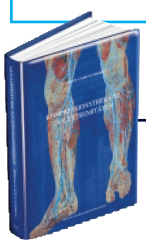

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Mariani F, Marone EM, Gasbarro V, Bucalossi M, Spelta S, Amsler F, Agnati M, Chiesa R

Multicenter randomized trial comparing compression with MCS versus bandage after surgery for varicose veins

AIM

To evaluate the effectiveness of a new stocking kit after venous surgery concerning the incidence of venous thromboembolism, hemorrhage, edema, hematoma, and pain.

METHODS

The clinical practicability, ease to use, effectiveness, and safety of a postoperative stocking system (23 to 32 mmHg at the ankle) was compared with compression bandages (control group). In a prospective, randomized, open-label clinical trial, performed in three Italian centers specializing in venous surgery. Sixty consecutive patients (CEAP C2,S) underwent unilateral varicose vein surgery. After surgery, patients were randomized for postoperative compression therapy with a new stocking system (Sigvaris Ulcer X; Sigvaris, St.Gallen, Switzerland) (n=30) or short or medium stretch bandages (n=30). Compression was worn for two weeks, day and night. Primary end points were incidence of venous thromboembolism, hemorrhage, limb hematoma, or edema.

RESULTS

No episodes of venous thromboembolism were observed. The mean area of thigh hematoma on postoperative days 7 and 14 was 75.70 cm^2 and 2.93 cm^2, respectively, for the stocking group, and 92.97 cm^2 and 5.42 cm^2 for the bandage group (not significant). After one week 50% of the patients wearing bandages, but only 20% of the patients wearing the stocking kit showed edema ($p< 0,001$). There was no significant difference for postoperative pain which showed a significant decrease compared to the preoperative scores after 3 days in both groups. Patients in the stocking group showed better patient acceptance and quality of life after the operation.

CONCLUSION

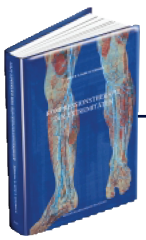
Patients can be effectively treated with the Sigvaris Ulcer X. Patients treated with medical compression stockings have less edema compared to standard bandaging, and the application of the stocking kit improves the patients' quality of life and compliance.

COMMENT

The staff of each center was made familiar with the use of the new stocking kit, but obviously not with the application of a proper bandage. This explains the high rate of sliding (40%) and of edema after bandaging, especially in the thigh region. This study reflecting real life clearly shows that good compression stockings providing reproducible quality criteria are better than bandages applied using different materials and different techniques. It is interesting to note that patients reported in average less pain already one day after surgery compared to preoperative pain. This observation demonstrates the difficulty to differentiate discomfort and uneasiness from pain in CEAP 2s patients.

J Vasc Surg 2011;53:115–22

Chapter 8, 9, Number of references/number of self citations: 24/2,
Type of publication: multicenter randomized controlled trial,
Language: english



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COMPRESSION BULLETIN 20

Thomasset SC, Butt Z, Liptrot S, Fairbrother BJ, Makhdoomi KR

Ultrasound Guided Foam Sclerotherapy: Factors Associated with Outcomes and Complications

AIM
In recent years ultrasound guided foam sclerotherapy (UGFS) has become an increasingly popular treatment for varicose veins. Although many published series detail the results of UGFS, little is known about the factors, which are associated with outcomes and complications. The aim of this study was to identify these factors.

METHODS
The authors reviewed the prospectively collected databases of UGFS treated patients from July 2007 to July 2009. A successful outcome was defined as complete occlusion of the target vein on duplex scanning at follow-up. Eight factors were assessed to determine whether they were associated with outcomes and complications. These factors were age, gender, compliance with post-procedure compression hosiery, previous varicose vein surgery, single or multiple sites of injection, concentration of sclerosant, volume of sclerosant and pre-procedure severity score.

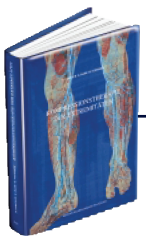
RESULTS
A total of 126 patients (60 men, 66 women) attended follow-up visits and had a post-procedure duplex scan. Targets for UGFS included the great saphenous vein (n = 75), small saphenous vein (n = 13) and anterior accessory great saphenous vein (n = 8). The remainder of procedures involved other veins or more than a single target vein. The median timing of follow-up was 3 months (range 1.5–14 months) with duplex scans revealing complete occlusion of the target vein in 79% of patients. The only factor associated with a successful outcome was compliance with post-procedure compression hosiery ($p < 0.05$). The most frequently encountered complications following UGFS were skin staining (28%), superficial thrombophlebitis (18%) and pain (14%). The only factor associated with post-UGFS complications was female gender ($p < 0.05$). When complications were analysed in isolation female gender was also significantly associated with skin staining ($p < 0.05$), but no other complication.

CONCLUSIONS
These data suggest that compliance with post-procedure compression hosiery and gender are important factors associated with a successful outcome and reported complications following UGFS, respectively.

COMMENT
This study suggests that compliance with compression can prevent side effects like staining after UGFS. However the number of patients with no compliance was only 8 compared with 118 patients with good compliance with compression. Hamel-Desnos could not find significant differences between compression and no compression after UGFS of saphenous veins. A randomized comparative trial should be conducted comparing compression and no compression after UGFS in all types of varicose veins.

EJVES 2010; 40: 389–392

Chapter: 9, Number of references/number of self citations: 19/0,
Type of publication: clinical trial. Language: english



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COMPRESSION BULLETIN 20

ten Cate-Hoek AJ, ten Cate H, Tordoir J, Hamulyák K, Prins MH

Individually tailored duration of elastic compression therapy in relation to incidence of the postthrombotic syndrome

AIM
The authors assessed whether individualized shortened duration of elastic compression stocking (ECS) therapy after acute deep venous thrombosis (DVT) is feasible without increasing the incidence of postthrombotic syndrome (PTS).

PATIENTS AND METHODS
At the outpatient clinic of the Maastricht University Medical Centre, 125 consecutive patients with confirmed proximal DVT were followed for 2 years. Villalta scores were assessed on four consecutive visits; 3, 6, 12, and 24 months after the acute event. Reflux was assessed once by duplex testing. After 6 months, patients with scores ≤4 on the Villalta clinical score and in the absence of reflux were allowed to discontinue ECS therapy. If reflux was present, two consecutive scores ≤4 were needed to discontinue ECS therapy.

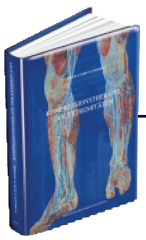
RESULTS
ECS therapy was discontinued in 17% of patients at 6 months, in 48% at 12 months, and in 35% at 24 months. Reflux on duplex testing was present in 74/101 (73.3%) tested patients and was not associated with the onset of PTS. At the 6-month visit, the cumulative incidence of PTS was 13.3%, at 12 months 17.0%, and at 24 months 21.1%. Varicosities/venous insufficiency (present at baseline) was significantly associated with PTS; hazard ratio 3.2 (1.2-9.1).

CONCLUSIONS
Patients with a low probability for developing PTS can be identified as early as 6 months after the thrombotic event, and individualized shortened duration of ECS therapy based on Villalta clinical scores may be a safe management option. These findings need to be confirmed in a randomized clinical trial.

COMMENT
This study suggests that PTS is developing early within the first 6 months in most of the cases. In consequence, the question if compression should be continued could also be answered earlier than after two years. Villalta score was used to define PTS and reflux was not well correlated with PTS diagnosis. However Villalta score is not specific for PTS and can also be in a pathologic range due to signs and symptoms caused by varicose veins.

J Vasc Surg 2010; 52: 132–138

Chapter: 9, Number of references/number of self citations: 20/0, Type of publication: prospective clinical trial, Language: english



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COMPRESSION BULLETIN 20

Mosti G, Partsch H

Is low compression pressure able to improve venous pumping function in patients with venous insufficiency?

BACKGROUND
Too high resting pressure of compression devices is poorly tolerated and may cause skin defects, especially in patients with concomitant arterial occlusive disease.

AIM
To investigate under which conditions low compression pressure could also improve venous pumping function in patients with venous incompetence.

MATERIAL AND METHODS
In 20 patients with severe reflux in the great saphenous vein, all of them candidates for surgery, venous pumping function was assessed by measuring ejection fraction of the calf pump using strain-gauge plethysmography. Measurements were repeated after application of knee-high medical compression stockings and of inelastic bandages applied with a pressure of 20, 40 and 60 mmHg in the supine position.

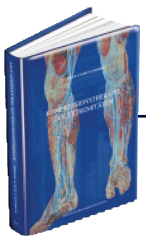
RESULTS
Compared to healthy controls patients showed a significantly reduced ejection fraction. Compression stockings exerting a median pressure of 27 mmHg (IQR 25-29) in the supine and 30,5 mmHg (IQR 28,25-34,25) in the standing position achieved a moderate improvement of ejection fraction of 17%(n.s.).
Inelastic bandages with a resting pressure of 20,5 mmHg (IQR 20-22) in supine and of 36 mmHg (IQR 33-40,75) in standing led to a significant increase of ejection fraction of +61,5% ($p<0,01$). A further increase of the resting pressure to 40 mmHg and 60 mmHg resulted in an increase of the ejection fraction by +91% and +98% respectively ($p<0,001$).

CONCLUSIONS
In patients with venous pumping failure inelastic bandages produce a significant pressure-dependent increase of ejection fraction. A significant improvement in venous pumping function was achieved with inelastic bandages even at a resting pressure of 20 mmHg.

COMMENT
This study affirms the hemodynamic superiority of inelastic compression material which is effective even in low pressure ranges. The results have practical implications in patients with mixed, arterial-venous disease in whom strong compression bandages are contraindicated and also in legs bandaged for several days where the initial pressure will drop. In both situations a satisfying improvement of the venous pump by low inelastic compression may be expected.

Phlebology 2010;25:145–150

Chapter 8, 9, Number of references/number of self citations: 18/11,
Type of publication: clinical experimental trial, Language: english



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COMPRESSION BULLETIN 20

Mosti G, Mattaliano V, Arleo S, Partsch H

Thigh compression after great saphenous surgery is more effective with high pressure

AIM
To compare the efficacy of three different compression devices as a function of the pressures exerted.

MATERIAL AND METHODS
54 patients undergoing invagination stripping of the great saphenous vein and side branch evulsion under local anaesthesia were treated postoperatively in sequential order by A) thigh length compression stockings, B) adhesive bandages and C) newly developed eccentric compression pads fixed with tapes together with a thigh length stocking on top. Sub-bandage pressures were measured at mid-thigh level under these devices after application and one week later before compression was removed. Pain, hematoma, bleeding through the bandage, discomfort and skin irritations was recorded and rated as major or minor adverse events using a scoring system.

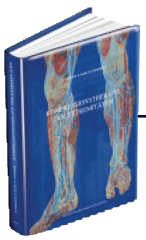
RESULTS
The lowest sub-bandage pressures of around 15 mmHg at thigh level in the lying position were found in group A under the compression stockings, which nominally provide 23-32 mmHg at ankle level. Group B and group C showed significantly higher values on the thigh (median values of 47 and 68 mmHg respectively in lying position, p<0,001). The median pressure values in the three groups upon standing were 16 mmHg, 63 mmHg and 98 mmHg. One week later there was a pressure-drop in the lying position in the three groups of 13%, 64%, and 46% respectively. Major adverse events were seen in a total of 10 of 18 patients in group A, in 1/18 in group B, and in 0/18 in group C. Minor adverse events in the three groups consisting mainly of local skin irritations were observed in 6, 3 and 12 cases respectively.

CONCLUSIONS
The best results with respect to the reduction of pain and hematoma were obtained when eccentric compression pads were taped to the skin of the thigh and a compression stocking was worn on top. A possible explanation for these observations is the very high local pressures under the eccentric device.

COMMENT
Proper and effective compression of the thigh is a challenge. For those who are not experienced in applying strong adhesive or cohesive bandages to the thigh compression stockings in combination with eccentric compression by firm pads may be a valuable alternative.

International Angiology 2009; 28: 274–280

Chapter 8, 9, Number of references/number of self citations: 17/4, Type of publication: clinical trial, Language: english



Mosti G, Partsch H

Inelastic bandages maintain their hemodynamic effectiveness over time despite significant pressure loss

BACKGROUND
One major draw-back of inelastic bandages is the fast pressure drop after application which might be associated with a loss of efficacy in contrast to elastic material which maintains its pressure and performance.

AIM
of this study was to compare the effect of inelastic bandages versus a double elastic compression stocking on the venous pumping function in patients with severe superficial venous insufficiency immediately after application and one week later.

MATERIAL AND METHODS
In 18 patients presenting with bilateral reflux in the great saphenous vein (CEAP C3-C5) ejection fraction (EF) of the calf pump was measured without compression and immediately after application of an inelastic bandage on one leg and a compression stocking kit on the other leg. The stocking kit designed to treat venous ulcers consisted of a basic liner and a class II stocking. Measurements were repeated one week later before compression removal. EF was measured using plethysmography on the uncovered proximal lower leg during standardized exercise. The changes of interface pressure of the applied compression products were recorded simultaneously.

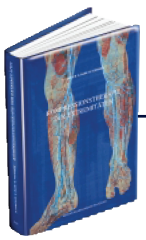
RESULTS
After application, bandages and stockings achieved a significant improvement of EF (P<.001), more pronounced in the bandaged legs. The median resting pressure at the distal leg level was 45 mmHg (IQR 41-48,5) under the stocking-kit and 64,5 mmHg (IQR 51-80) under the bandages. After one week, EF was still significantly improved in the bandaged leg (P< .001) but not under the stockings. At this time the pressure under the stockings was only slightly reduced (5.9% in supine and 3.6% in standing position) while the mean pressure loss under the bandages was much higher (54% in supine and 35% in the standing position).

CONCLUSIONS
In patients with severe venous incompetence inelastic material is able to restore the venous pumping function to within the normal range and maintain its effect over one week despite a significant pressure loss. Elastic material slightly improves the venous pumping function at application and one week later, but is unable to normalize the venous pump.

COMMENT
This is the first study which measured the venous pumping function under ulcer stocking kits in patients with severe venous insufficiency. It is shown that such stocking kits achieve a significant improvement of the ejection fraction, which is maintained after one week of wearing. However, inelastic compression bandages exerting a much higher initial pressure were significantly superior, both after application and also after one week in spite of considerable loss of pressure. The positive effect of the venous pump correlates with the stiffness of the compression material demonstrated by higher pressure peaks during standing and walking under the inelastic bandage.

J Vasc Surg 2010; 52: 925–931

Chapter 8, 9, Number of references/number of self citations: 24/7,
Type of publication: clinical experimental trial, Language: english



Nose Y, Murata K, Wada Y, Tanaka T, Fukagawa Y, Yoshino H, Susa T, Kihara C, Matsuzaki M

The impact of intermittent pneumatic compression devices on deep venous flow velocity in patients with congestive heart failure

AIM
Congestive heart failure (CHF) is a major risk factor for deep venous thrombosis. Intermittent pneumatic compression (IPC) has been used to prevent deep venous thrombosis (DVT), but the effects of IPC on the hemodynamics of popliteal and soleal vein have not been evaluated. The aim of this study was to evaluate the effects of IPC on the flow velocity of deep veins in the lower extremities and to compare the efficacy of two different types of IPC in deep venous flow enhancement in patients with CHF.

METHODS
Flow velocities of popliteal and soleal veins were recorded in 19 patients with CHF and in 19 control subjects using a high-resolution linear probe. Peak and mean flow velocities were measured at rest, with sequential foot and calf IPC (SFC-IPC) which consists of an electrically driven air compressor and four air chambers, and with impulse foot IPC (IF-IPC) which consists of a pneumatic impulse generator operated at an applied pressure of 130 mmHg.

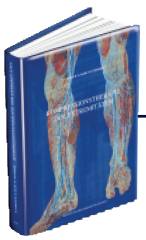
RESULTS
In the resting condition, popliteal venous flow velocity in the CHF group was attenuated (12.8 ± 4.7 cm/s vs. 21.1 ± 13.5 cm/s; $p < 0.05$). Both SFC-IPC and IF-IPC increased venous velocity, but the increase with IF-IPC in CHF patients was lower than that in control subjects. In the soleal veins, after applying SFC-IPC, the peak and mean velocity in CHF increased to the same extent as in the control group. IF-IPC increased soleal venous velocity in control subjects, but there was no increase in CHF patients.

CONCLUSIONS
Two-dimensional Doppler scanning revealed a significant increase in the mean and peak velocities in the soleal and popliteal veins with SFC-IPC but not with IF-IPC in patients with CHF. These results indicate that SFC-IPC could have favorable effects in preventing DVT in patients with CHF.

COMMENT
This well conducted study demonstrates that the reduced popliteal flow in CHF patients can be enhanced with sequential foot and calf IPC (SFC-IPC) significantly. However this is no proof that this device has also a protective effect for thromboembolic events in these patients. This should be proven in a prospective comparative and randomized trial with the clinical endpoint of thromboembolic events.

J Cardiol 2010; 55: 384–390

Chapter: 7, Number of references/number of self citations: 20/0, Type of publication: experimental clinical trial, Language: english



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