

Randomized trial of medical compression stockings versus two-layer short-stretch bandaging in the management of venous leg ulcers

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Keywords

Medical compression stockings, venous leg ulcers

Summary

A prospective randomized clinical trial was undertaken to compare a medical compression stockings with two-layer short-stretch bandaging in the management of venous leg ulcers. Study endpoints were number of completely healed wounds and the clinical parameters predicting the outcome. **Patients, methods:** Eighty patients with venous leg ulcers were included in this study, and ultimately allocated into two comparative groups. Group A consisted of 40 patients (25 women, 15 men). They were treated with the compression stockings (25–32 mmHg) and drug therapy. Group B consisted of 40 patients (22 women, 18 men). They were treated with the short-stretch bandages (30–40 mmHg) and drug therapy, administered identically as in group A. **Results:** Within two months the 15/40 (37.50%) patients in group A and 5/40 (12.50%) in group B were healed completely ($p = 0.01$). For patients with isolated superficial reflux, the healing rates at two months were 45.45% (10/22 healed) in group A and 18.18% (4/22 healed) in group B ($p = 0.01$). For patients with superficial plus deep reflux, the healing rates were 27.77% (5/18 healed) in group A and 5.55% (1/18 healed) in group B ($p = 0.002$). Comparison of relative change of the total surface area (61.55% in group A vs. 23.66% in group B), length (41.67% in group

A vs. 27.99% in group B), width (46.16% in group A vs. 29.33% in group B), and volume (82.03% in group A vs. 40.01% in group B) demonstrated difference ($p = 0.002$ in all comparisons) in favour of group A. **Conclusion:** The medical compression stockings are extremely useful therapy in enhancement of venous leg ulcer healing (both for patients with superficial and for patients who had superficial plus deep reflux). Bandages are less effective (especially for patients with superficial plus deep reflux, where the efficiency compared to the stockings of applied compression appeared dramatically low). These findings require confirmation in other randomized clinical trials with long term results.

Schlüsselwörter

Medizinische Kompressionsstrümpfe, venöse Beingeschwüre

Zusammenfassung

In einer randomisierten klinischen Studie zur Versorgung venöser Beinulzera wurden medizinische Kompressionsstrümpfe mit zweilagigen Kurzzugbandagen verglichen. Studienendpunkte waren die Anzahl komplett geheilter Wunden und die klinischen Parameter, anhand derer das Ergebnis prognostiziert werden konnte. **Patienten, Methoden:** 80 Patienten mit venösen Beinulzera wurden in die Studie aufgenommen und zwei Gruppen zugeteilt. Gruppe A aus 40 Patienten (25 Frauen, 15 Männer) wurde mit den Kompressionsstrümpfen (25–32 mmHg) und medikamentös behandelt. Gruppe B enthielt 40 Patienten (22 Frauen, 18 Männer),

die mit den Kurzzugbandagen (30–40 mmHg) und mit den gleichen Medikamenten wie Gruppe A behandelt wurden. **Ergebnisse:** Innerhalb von zwei Monaten waren 15/40 Patienten (37,50%) der Gruppe A und 5/40 (12,50%) der Gruppe B vollständig geheilt ($p = 0,01$). Bei Patienten mit einem isolierten oberflächlichen Reflux lagen die Heilungsraten nach zwei Monaten bei 45,45% (10/22) in Gruppe A und 18,18% (4/22) in Gruppe B ($p = 0,01$). Bei Patienten mit oberflächlichem und tiefem Reflux betrugen die Heilungsraten 27,77% (5/18) in Gruppe A und 5,55% (1/18) in Gruppe B ($p = 0,002$). Der Vergleich der relativen Veränderung der Gesamtoberfläche (61,55% in Gruppe A vs. 23,66% in Gruppe B), Länge (41,67% in Gruppe A vs. 27,99% in Gruppe B), Breite (46,16% in Gruppe A vs. 29,33% in Gruppe B) und des Volumens (82,03% in Gruppe A vs. 40,01% in Gruppe B) zeigte einen Unterschied ($p = 0,002$ in allen Vergleichen) zu Gunsten der Gruppe A. **Schlussfolgerung:** Medizinische Kompressionsstrümpfe stellen eine äußerst vorteilhafte Therapie zur verbesserten Abheilung venöser Beinulzera (für Patienten mit oberflächlichem und auch mit oberflächlichem plus tiefem Reflux) dar. Bandagen sind weniger wirksam (insbesondere bei Patienten mit oberflächlichem plus tiefem Reflux, bei denen die Wirksamkeit der Bandagen im Vergleich zu den Strümpfen mit dem verwendeten Kompressionsgrad extrem niedrig erschien). Diese Befunde sollten in weiteren randomisierten Studien mit Langzeitergebnissen bestätigt werden.

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Medizinische Kompressionsstrümpfe versus zweilagige Kurzzugbandagen zur Versorgung venöser Beinulzera – eine randomisierte Studie
Phlebologie 2009; 38: 157–163

Received: April 14, 2009
accepted in revised form: July 20, 2009

Essai clinique randomisé comparatif entre les bas compressifs et des bandages élastiques courts à double couche dans le traitement des ulcères variqueux

Mots clés

Bas médicaux compressifs, ulcères variqueux

Résumé

Une étude clinique randomisée prospective a été effectuée pour comparer des bas compressifs avec des bandages élastiques courts à double couche pour le traitement d'ulcères variqueux. Une appréciation a été faite concernant les plaies totalement guéries et les paramètres cliniques prédictifs de guérison.

Patients et méthode : 80 patients avec des ulcères variqueux ont été inclus dans cette étude et séparés en 2 groupes comparatifs : groupe A : 40 patients (25 femmes, 15 hommes), traités avec des bas élastiques (25–32 mmHg) et thérapie médicamenteuse. Groupe B : 40 patients (22 femmes et 18 hommes) traités par des bandages élastiques courts (30–40 mmHg) et thérapie médicamenteuse semblable à celle du groupe A. **Résultats :** En 2 mois, dans le groupe A, 15 patients (37,5%) et 5 patients du groupe B (12,5%) ont complètement guéri ($P=0,01$). Chez les patients présentant un reflux superficiel isolé, le taux de guérison à 2 mois a été de 45,45% dans le groupe A et de 18,18% dans le groupe B ($p = 0,01$). Pour les patients présentant un reflux superficiel et profond, le taux de guérison a été de 27,77% dans le groupe A et de 5,55% dans le groupe B ($p = 0,02$). La comparaison de l'amélioration relative de la surface totale (61,55% dans le groupe A et 23,66% dans le groupe B) de la longueur (47,67% dans le groupe A et 27,99% dans le groupe B), de la largeur (46,16% dans le groupe A et 29,33% dans le groupe B) et du volume (82,3% dans le groupe A et 40,01% dans le groupe B) a montré une différence ($P=0,002$ dans toutes les comparaisons) en faveur du groupe A. **Conclusion :** Les bas à contention élastique sont un traitement très utile pour la guérison des ulcères variqueux (pour les 2 types de patients avec reflux superficiel ou reflux superficiel et profond). Les bandages sont moins efficaces (spécialement chez les patients avec un reflux superficiel et profond où l'efficacité comparée aux bas élastiques est apparue très faible). Ces constatations demandent une confirmation dans d'autres essais cliniques à long terme.

Venous leg ulcer is common, recurring condition which affects around three in every 2000 adults in the world (3). European studies have reported a prevalence of 1% in the adult population, increasing dramatically in those aged more than 80. Most people with leg ulcers are elderly women. There is considerable cost to the patient in terms of pain, social isolation and quality of life (2, 14). The health service provides nursing and medical care, as well as dressings, bandages and drug treatments.

Leg ulcers are associated with venous disease and this is treated by preventing venous hypertension through the application of external graduated compression. There are many methods of applying external graduated compression, such as elasticated bandages, Unna's boots, multilayer elastic compression bandages, short stretch bandages and elastomeric hosiery.

High compression (defined as ankle sub-bandage 35–40 mmHg) and multilayer systems seem to be more effective than low compression and singlelayer bandages (a pressure range between 23 and 32 mmHg at the ankle), but differences in effectiveness of various types of compression are not clear (10, 11, 13, 15). The use of graduated elastic compression stockings has been evaluated in a few studies only and the true potential of treatment with hosiery remains to be examined (1).

A prospective randomized clinical trial was undertaken to compare a medical compression stockings (25–32 mmHg) with a two-layer short-stretch bandaging, exerting 30–40 mmHg of pressure in the management of venous leg ulcers. Study endpoints were number of completely healed wounds and the clinical parameters predicting the outcome.

Patients and methods

The methods, the plan and scope of therapy, inclusion of patients into the groups, and other procedures of the scientific research were reviewed, approved, and accepted by the Bioethical Commission of Medical University of Silesia in Katowice, Poland.

This clinical trial was conducted from September 2006 to February 2008. Eighty patients with venous leg ulcers were included in this study, and ultimately allocated into two comparative groups. Inclusion and exclusion criteria are presented in ► Figure 1. Group A consisted of 40 patients (25 women, 15 men). They were treated with the compression stockings and drug therapy. Patients in this group were treated in Dermatology Department of the Hospital No. 2 in Bytom. Group B consisted of 40 patients (22 women, 18 men). They were treated with the short-stretch bandages and drug therapy, administered ident-

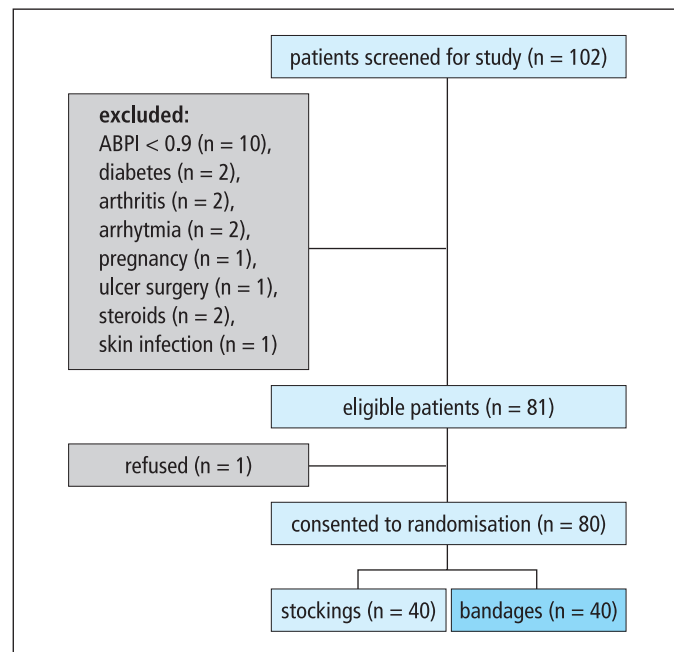


Fig. 1
Patient flow through trial

ically as in group A. Patients in this group were treated in Dermatology Department of Medical University of Silesia in Katowice. All patients were examined at one center (Biophysics Department of Medical University of Silesia in Katowice), randomized to stockings or bandages. Computer generated random numbers were sealed in sequentially numbered envelopes and group allocation was independent of place and person delivering the treatment. Then patients were sent for treatment to Hospital No. 2 in Bytom (those treated with bandages) or to the Dermatology Department of Medical University of Silesia in Katowice (those treated with stockings).

Other details of the examined persons and ulcers are shown in ▶ Table 1. Patients were evaluated using the CEAP classification of chronic venous insufficiency (▶ Tab. 2).

All ulcers in the groups were diagnosed as venous. Patients were examined (9 segments – upper and lower great saphenous vein, lesser saphenous vein, proximal and distal femoral vein, proximal and distal popliteal vein, saphenofemoral junction and saphenopopliteal junction) by duplex scanning (EUB 555, Hitachi Inc, Japan). The thigh veins were examined with the participant standing, whereas the calf veins were examined in the sitting position, with the leg dependent. Each vein segment was imaged both in cross section and longitudinally. When the vessels were imaged in cross section, the direction of the Doppler shift was represented by a color scale over the blood vessels (red = flow in proximal direction, blue = flow in distal, retrograde direction). In longitudinal images, the numerical velocity of red blood cells within each segment was plotted against time. A transient increase in proximal flux was generated by manually squeezing the limb distal to the segment under examination. On releasing the distal compression, significant amounts of blood pass distally (pathological reflux) if the valve proximal to the site of examination does not close properly. For assessment of the calf veins, the foot was compressed, for assessment of the thigh veins, the calf was compressed. Criteria for pathological reflux was duration >0,5 s and peak reflux velocity >10 cm/s.

All patients had the symptoms of CVI, i. e. oedema, hyperpigmentation and lipodermatosclerosis of the affected limb. The

Tab. 1 Characteristics of patients and ulcers

		group A	group B	p
number of patients		40	40	>0.05
age (years)	average	63.44	61.96	>0.05
	SD	8.86	8.33	
	range	40–80	43–80	
sex*	female	25	28	>0.05
	male	15	12	
body weight (kg)	average	76.31	77.17	>0.05
	SD	10.82	12.09	
	range	55–93	60–94	
body height (cm)	average	174.02	170.83	>0.05
	SD	8.32	9.13	
	range	159–187	142–186	
localization* of ulcers	medial ankle	21	20	>0.05
	lateral ankle	7	5	
	anterior crural surface	9	10	
	posterior crural surface	4	5	
duration of disorder (months)	average	30.54	30.11	>0.05
	SD	23.33	25.09	
	range	2–100	4–98	
initial wound total area (cm ²)	average	20.57	20.33	>0.05
	SD	14.02	9.67	
	range	6.78–39.01	10.22–34.35	
initial wound volume (cm ³)	average	3.66	3.29	>0.05
	SD	4.01	4.15	
	range	0.22–6.94	0.31–7.91	

T-test; * χ^2 independence test

Tab. 2 Classification of CVI

CEAP class	group A	group B	p
C ₆ E _p A _{S2,3} P _R	15	15	>0.05
C ₆ E _p A _{S4} P _R	7	7	>0.05
C ₆ E _p A _{S2D13} P _R	5	5	>0.05
C ₆ E _p A _{S3D13} P _R	4	5	>0.05
C ₆ E _p A _{S2,3D13,14P18} P _R	7	5	>0.05
C ₆ E _s A _{S2,3D13,14P18} P _R	2	3	>0.05
total number of patients	40	40	

body mass index (BMI) was calculated for all patients. According to international norms, a BMI higher than 30 kg/m² indicated adipositas (ten persons in group A and eleven in group B). The number of smokers was recorded as well. Twelve smokers noticed in group A and eleven in group B.

Patients in group A were treated with medical compression stockings (Sigvaris 702,

Gianzoni & Cie AG, Switzerland – certified in Poland) providing pressure 25–32 mmHg at the ankle. The stockings were put on the leg at the outpatient clinic every morning and worn whole day (about 10–12 hours); and put off on night. Patients in group B were treated with short-stretch bandaging. The pressure values were standardized in use of Kikuhime manometer (30–35 mmHg for superficial re-

flux and 35–40 mmHg for superficial with deep venous reflux). Bandages were applied in two layers with spinal turns on foot and turns in eight on calf. The bandages were worn day and put off on night.

The drug therapy in both groups followed a standard regimen. All patients received micronized flavonoid fraction (450 mg diosmin, 50 mg hesperidin), 2 tablets of 500 mg once daily (MPFF, Detralex). The ulcer ground was covered with wet dressings (Sterilux) of 0.9% sodium chloride, as well as compresses of fibrolan, chloramphenicol, colistin. Dressings were changed once a day and exclusively at the clinic. The ulcers were also treated with local baths of potassium permanganate once daily. Therapy in group A and B lasted two months.

Treatment progress was evaluated by observation of the number of completely healed ulcers, and measuring the area and isolated areas (covered with pus or granulation) of the ulceration by planimetry of congruent projections of these wounds onto transparency paper using a digitizing pallet. Depth of the ulceration was precisely measured in various points by micrometer (person who assessed parameters of ulcers was not blinded to the therapy). Later, noticed results were transferred to software. The electronic equipment for the measurement of areas and volumes of the ulcers consisted of the digitizer (Kurta XGT, Altek Inc, USA) wired to a personal computer with modified software (C – GEO) thus allowing the calculation of these parameters. Measurements of areas and volumes were performed in each person before therapy, every week during treatment, and after therapy. From this data, the software calculated the area and volume of tissue deficiency in ulcerations. Measurements were also made of length and perpendicular width dimensions (for observation, the correlation between surface area, volume and linear dimensions). The observation of healing process was supported by precisely calculated parameters, such as Gilman index (5) – a parameter for changes of circumference compared to the surface (analysis of healing process according to the shape of the wound) – and relative changes. These indicators were defined as follows:

Gilman index (cm) d

$$d = \frac{\Delta S}{P} = \frac{S_I - S_F}{(C_F + C_I)/2} = \frac{2(S_I - S_F)}{C_F + C_I}$$

S_I, S_F – initial and final total area (cm²);
 C_I, C_F – initial and final circumference (cm)

Relative changes

Total surface area $\Delta S\%$

$$\Delta S\% = \frac{(S_I - S_F) * 100\%}{S_I}$$

S_I, S_F – initial and final total area (cm²)

Length $\Delta L\%$

$$\Delta L\% = \frac{(L_I - L_F) * 100\%}{L_I}$$

L_I, L_F – initial and final length (cm)

Width $\Delta W\%$

$$\Delta W\% = \frac{(W_I - W_F) * 100\%}{W_I}$$

W_I, W_F – initial and final width (cm)

Volume $\Delta V\%$

$$\Delta V\% = \frac{(V_I - V_F) * 100\%}{V_I}$$

V_I, V_F – initial and final volume (cm³)

Pus degree $\Delta R\%$

The pus degree ($\Delta R\%$) was calculated from percentage relative changes of the pus-covered areas (R_I, R_F):

$$\Delta R\% = \frac{(R_I - R_F) * 100\%}{R_I}$$

$$R_I = \frac{S_{inf1}}{S_I * 100\%}$$

R_I – relative change of the pus-covered area before therapy (%); S_{inf1} – initial pus-covered area (cm²); S_I – initial total area (cm²)

$$R_F = \frac{S_{inf2}}{S_F * 100\%}$$

R_F – relative change of the pus-covered area after therapy (%); S_{inf2} – final pus-covered area (cm²); S_F – final total area (cm²)

Granulation degree $\Delta Z\%$

The granulation degree ($\Delta Z\%$) was calculated from percentage relative changes of the granulation areas (Z_I, Z_F):

$$\Delta Z\% = \frac{(Z_I - Z_F) * 100\%}{Z_I}$$

$$Z_I = \frac{S_{gran1}}{S_I * 100\%}$$

Z_I – relative change of the granulation area before therapy (%); S_{gran1} – initial granulation area (cm²); S_I – initial total area (cm²)

$$Z_F = \frac{S_{gran2}}{S_F * 100\%}$$

Z_F – relative change of the granulation area after therapy (%); S_{gran2} – final granulation area (cm²); S_F – final total area (cm²)

Data analysis

The χ^2 independence test (greatest reliability level) and parametric t-test were used for analysis of indicators, which characterized patients in all comparative groups. The normal distribution was checked by Kolmogorov-Smirnow and the χ^2 test. Mean values of Gilman index, total area (isolated pus-covered and granulation areas), length, width, and volume of the ulcers before and after therapy were compared in groups by parametric t-test. Differences in number of the completely healed ulcers and relative changes between groups were evaluated with t-test. Two-sided p values of less than 0.05 were considered to be statistically significant. To define relationships between the change of wound area and volume with changes of linear dimensions the Spearman correlation index was used.

Results

The examined groups were homogeneous in terms of patients' characteristics (► Tab. 1, ► Tab. 2). After therapy, there was a statistically significant reduction ($p \leq 0.001$) of the total area, length, width, and volume of ulcers

in two comparative groups (► Tab. 3). In group A, the Gilman index increased from 0.18 cm to 0.89 cm ($p \leq 0.001$), and in group B from 0.19 cm to 0.55 cm ($p \leq 0.001$).

The 15/40 (37.50%) patients in group A and only 5/40 (12.50%) in group B were healed completely ($p \leq 0.001$). For patients with isolated superficial reflux, the healing rates at two months were 45.45% (10/22 patients) in group A and 18.18% (4/22 patients) in group B ($p \leq 0.01$). For patients with superficial plus deep reflux, the healing rates were 27.77% (5/18 patients) in group A and only 5.55% (1/18 patients) in group B ($p \leq 0.01$). Comparison of relative change of the total surface area (61.55% in group A vs. 23.66% in group B), length (41.67% in group A vs. 27.99% in group B), width (46.16% in group A vs. 29.33% in group B), and volume (82.03% in group A vs. 40.01% in group B) demonstrated difference ($p \leq 0.01$ in all comparisons) in favour of group A. The statistically more decrease of pus ($p \leq 0.0001$) and greater promotion of granulation degree ($p \leq 0.01$) were observed in group A ($\Delta R = 96.23\%$, $\Delta Z = 66.01\%$) than in group B ($\Delta R = 50.11\%$, $\Delta Z = 40.25\%$).

In both comparative groups the change of wound area and volume occurred simultaneously with changes of linear dimensions (► Fig. 2). In group B the correlation between change of total area and length of ulcers was 0.65 ($p \leq 0.01$), total area and width was 0.64 ($p \leq 0.01$), total area and volume was 0.56 ($p \leq 0.01$). That was beneficial for wound healing, which progressed steadily – however the process was more steady and significant in patients with stockings.

Discussion

Our study was set within established leg ulcer service across three centers. The weakness of the situation was that we could not control systematic influences at the same time in all hospitals. The strength was that patients were separated and could not contact with other individuals. The patient stratification based on findings from color venous duplex scanning. We did not use other non-invasive assessment of venous refill time using photoplethysmography. The weakness of the following study is that we did not observe long term results (future studies, follow-up 6, 12

Tab. 3 Results in group A and B

parameter of the wound	group	mean \pm SD		p
		before therapy	after therapy	
Gilman index (cm)	A	0.18 \pm 0.13	0.89 \pm 0.55	p(A) = 0.001 p(B) = 0.001
	B	0.19 \pm 0.12	0.55 \pm 0.34	
total area (cm ²)	A	20.57 \pm 14.02	10.05 \pm 9.67	p(A) = 0.001 p(B) = 0.001
	B	20.33 \pm 13.09	15.02 \pm 13.87	
length (cm)	A	6.22 \pm 2.04	3.45 \pm 2.98	p(A) = 0.001 p(B) = 0.001
	B	6.07 \pm 2.09	4.34 \pm 3.11	
width (cm)	A	4.15 \pm 1.52	2.70 \pm 2.11	p(A) = 0.001 p(B) = 0.001
	B	4.12 \pm 1.45	3.42 \pm 2.06	
volume (cm ³)	A	3.66 \pm 4.01	0.73 \pm 1.09	p(A) = 0.001 p(B) = 0.001
	B	3.29 \pm 4.15	0.58 \pm 1.28	
pus-covered area (cm ²)	A	12.52 \pm 8.41	0.52 \pm 0.99	p(A) = 0.001 p(B) = 0.001
	B	12.03 \pm 9.79	3.27 \pm 4.23	
granulation area (cm ²)	A	8.05 \pm 6.21	9.53 \pm 12.05	p(A) = 0.01 p(B) = 0.01
	B	8.30 \pm 5.77	11.75 \pm 13.02	

and 24 months). The strength is that we compared both compression therapies in use of many objective parameters and conducted observation of steady healing process. The following study is the first one.

Various forms of compression therapy have been applied over the years. At present there is a wide variation in the management of venous leg ulcers. In the USA, Unna's boot (a non-compliant, plaster type bandage) is favoured; in the UK, multilayer elastic compression is widely used; while in mainland Europe and Australia the inelastic, short stretch bandaging is common (3). A review of most randomized trials revealed that compression is more effective than dressings, drug therapy alone (1) and the application of high pressures is believed to essential.

Our results indicated that medical compression stockings (25–32 mmHg at the ankle) applied in patients with venous leg ulcers from group A, reduced the wound total area by 61.55% and wound volume by 82.03% of the initial size. The healing rate was 37.50% (15/40 healed) at only two months. For patients with isolated superficial reflux, the healing rate was 45.45% (10/22 healed). For patients with superficial plus deep reflux, the healing rate was 27.77% (5/18 healed). In group B (two-layer short-stretch bandaging, 30–40 mmHg), wound total area decreased by 23.66% and wound volume by 40.01%

(the healing rate was only 12.50%). For patients with isolated superficial reflux, the healing rate was 18.18% (4/22 healed). For patients with superficial plus deep reflux, the healing rate was extremely low 5.55% (only 1/18 healed).

The results from group A appeared to correspond (mostly even more promising) to other clinical studies from different modalities of leg compression (1, 4, 6, 7, 8, 9, 12, 16).

Gohel et al. (6) applied multilayer compression therapy bandaging in 258 patients with chronic venous ulceration, aiming for 40 mmHg of pressure at the ankle graduated to 17–20 mmHg at the upper calf. Patients with healed legs were prescribed class 2 elastic stockings and advised to wear these during the day. The healing rates were 65% at six month, 78% at one year and 89% at three years.

Meyer et al. (9) included to the study 112 patients with venous leg ulcers and all were treated with zinc-impregnated paste bandage applied directly to the ulcer. Fifty seven patients had the paste covered by Tensopress and 55 by Elastocrepe bandages. By 26 weeks, 58% of the patients treated with Tensopress and 62% of those treated with Elastocrepe bandages were healed.

Partsch et al. (12) compared the healing rates of venous ulcers obtained with four-layer bandages (4LB) versus short stretch

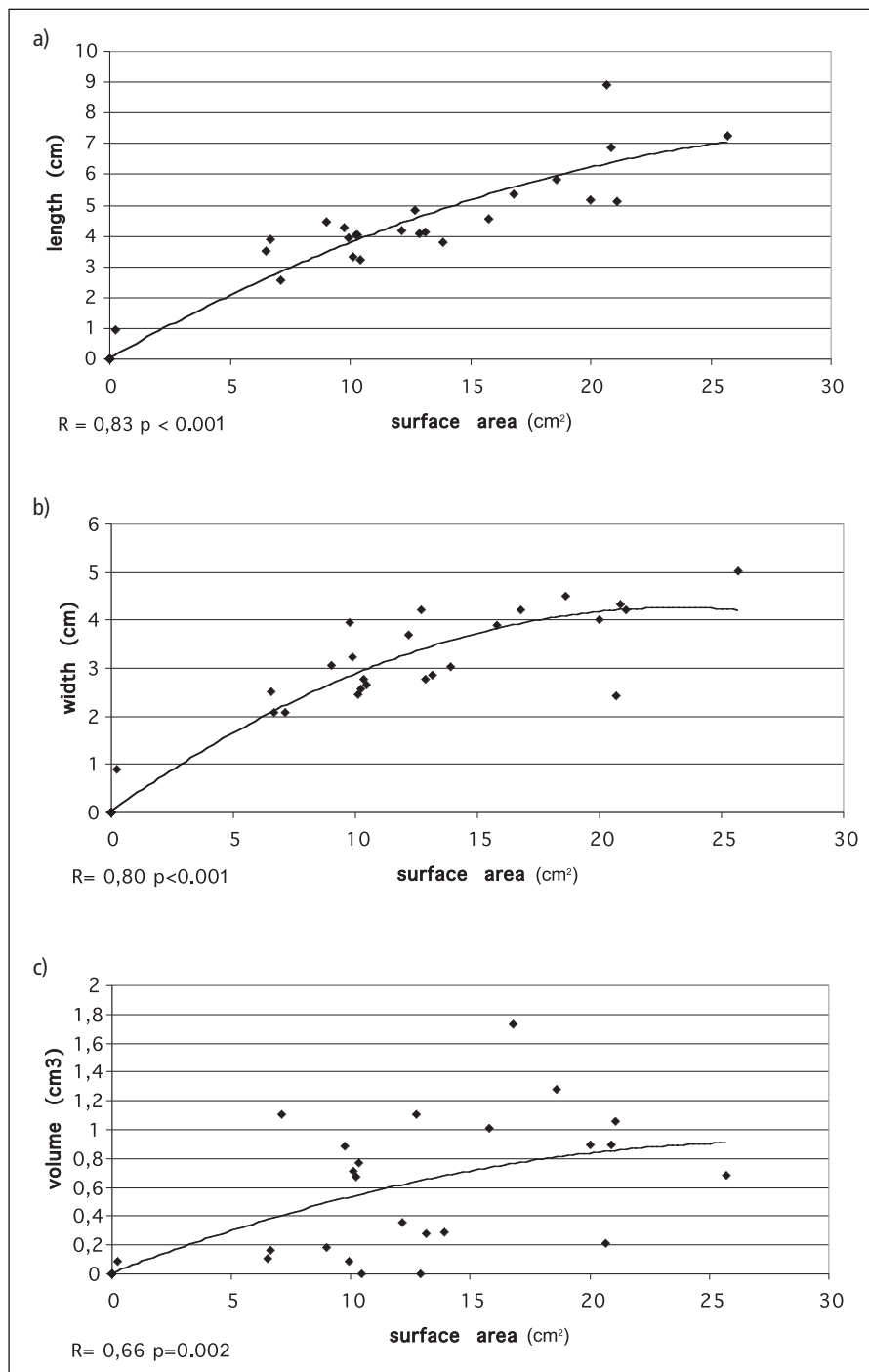


Fig. 2 Correlation between total area of ulcers and **a)** length; **b)** width; **c)** volume

bandages (SSB). After 4 months 62% ulcer patients were healed in the 4LB and 73% in the SSB group.

Franks et al. (4) after 6 months notice that 69% patients randomized to the 4LB had ulcer closure on treatment.

German clinicians observed 116 patients in 40 centers. In 77 patients (66.4%) treated with compression therapy Tubulcus, they had reported after 3 months complete healing of the ulcer or decrease of the size (16).

Similar healing rates after medical compression stockings in patients with venous leg ulcers compared to other types of leg compression support these usefulness. In our opinion compression therapy with stockings are easier to use, less painful and more comfortable to the patients.

This opinion is consistent with two interesting studies. Brizzio et al. (1) conclude after pilot results that ulcer healing appeared more rapid with the application of stockings than with bandaging. According to Mariani et al. (8) traditionally, venous leg ulcers are treated with firm nonelastic bandages. Medical compression stockings are not the first choice although comparative studies found them equally effective or superior to bandages. A multi-center randomized trial with 60 patients treated with either short stretch multi-layer bandages or a two-stocking system (Sigvaris® Ulcer X® kit) was conducted. Complete wound closure was achieved in 70.0% (21 of 30) with bandages and in 96.2% (25 of 26) with the ulcer X kit ($p = 0.011$). Ulcers with a diameter of up to about 4 cm healed twice as rapidly, the larger ones as fast with the stocking kit as with bandages.

Conclusion

The medical compression stockings are extremely useful as therapy in enhancement of venous leg ulcer healing (both for patients with superficial and for patients who had superficial plus deep reflux). Bandages are less effective (especially for patients with superficial plus deep reflux, where the efficiency of applied compression appeared dramatically low). These findings require confirmation in other randomized clinical trials with long term results.

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