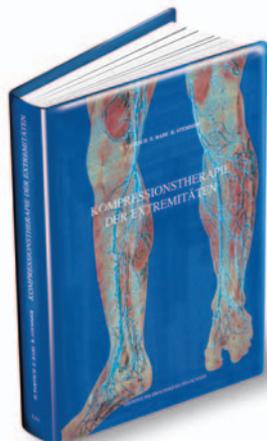


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Compression Bulletin

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**Special edition:
Lisboa IUA 2006**

Hsieh HF, Lee PP

Graduated compression stockings as prophylaxis for flight-related venous thrombosis: systematic literature review

Journal of Advanced Nursing 2005; 51: 83–98

Aim:

This paper reports a systematic review whose objective was to evaluate the effectiveness of graduated compression stockings as prophylaxis for flight-related venous thrombosis, including deep vein thrombosis and superficial venous thrombosis, after air travel in the general population.

Background:

Despite the extended history of the use of graduated compression stockings, their application to prevent flight related thrombosis was not explored until flight-related thrombosis was per-

ceived as a preventable illness. Even now, their effectiveness in preventing flight-related thrombosis remains unresolved.

Methods:

Generic terms including stocking/s, sock/s, or hosiery/hosieries were used to search a variety of electronic databases. Based on the selection criteria, decisions regarding inclusion and exclusion of primary studies were made. Using a meta-analysis software program, relative risk for the incidence of deep vein thrombosis, superficial venous thrombosis, and intention-to-treat analysis was calculated.

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Results:

A total of nine randomised controlled trials using below knee compression stockings (15–30 mmHg) were included. In the treatment group, 2 of 1.237 participants developed deep vein thrombosis in comparison with 46 of 1.245 in the control group. The weighted relative risk for deep vein thrombosis was 0.08, with fixed 95% confidence interval 0.03–0.23. In the treatment group, 4 of 826 participants developed superficial venous thrombosis in comparison with 7 of 823 in the control group. The weighted relative risk for superficial venous thrombosis was 0.67, with fixed 95% confidence interval 0.24–1.87 (non-significant difference). Using intention-to-treat analysis, the risk for participants in the treatment group was 0.53 times as great as that for those in the control group.

Conclusions:

This review demonstrates the effectiveness of medium compression pressure, below-knee graduated compression stockings in preventing flight related deep vein thrombosis but not superficial venous thrombosis in low-, medium- or high-risk participants.

Comment:

In two working groups in Great Britain and Italy it could be shown, that compression stockings class I and II are able to prevent flight-related venous thrombosis. The question if superficial phlebitis can also be prevented by compression stockings is open. Furthermore the much more frequent problem of leg swelling during long-distance-flights can also be prevented by low class compression stockings as could be shown in other studies.

Partsch H, Clark M, Bassez S, Benigni JP, Becker F, Blazek V, Caprini J et al.

Measurement of Lower Leg Compression In Vivo: Recommendations for the Performance of Measurements of Interface Pressure and Stiffness

Dermatol Surg 2006; 323: 224–233

Background:

Compression therapy is a very potent treatment modality producing clinical effects that depend mainly on the pressure that is exerted during rest and during walking. However this deciding parameter comparable to the dosage of a drug is only rarely measured in the clinical field.

Aim:

The aim of this consensus was to provide recommendations regarding the use of suitable methods for the measurement of interface pressure and of stiffness in vivo.

Method:

This paper was formulated based on the results of an international consensus meeting between a group of medical experts and representatives from the industry held in January 2005 in Vienna, Austria.

Results:

Proposals are made concerning methods for measuring the interface pressure and for assessing the stiffness of a compression device in an individual patient.

The ankle area (B-segment) which is a reference point for stocking producers is a problematic region for in vivo measurement for several reasons:

- the local radiuses in this leg segment show the highest variability of the lower extremity
- bony prominences and tendons prevail in this segment
- without padding the retromalleolar fossa will be compressed only when pads are used.

It is recommended to measure interface pressures at B1 which is the site where the medial gastrocnemial muscle changes into its tendinous part. Here the cross section of the leg comes close to a circle. This is the segment with the most extensive changes of circumference and configuration of the leg during standing up from the supine position and during walking, where stiffness can be assessed (increase of pressure produced by increase of circumference).

Conclusion:

In vivo measurement of interface pressure is encouraged when clinical and experimental outcomes of compression treatment are to be evaluated. It is essential to declare the type, dimension and site of the sensor.

Barwell JR, Davies CE, Deacon J, Harvey K et al

Comparison of surgery and compression with compression alone in chronic venous ulceration (ESCHAR study): randomised controlled trial.

Lancet 2004; 363: 1854–59

Background:

The addition of ablative superficial venous surgery to compression therapy has not been shown to affect ulcer healing, but does reduce ulcer recurrence. (ESCHAR = Effect of Surgery and Compression on Healing and Recurrence).

Methods:

500 consecutive patients from three centres were investigated by venous duplex imaging of ulcerated or recently healed legs. Those with isolated superficial venous reflux and mixed superficial and deep reflux were randomly allocated either compression treatment alone or in combination with superficial venous surgery. Multilayer compression bandages were applied every week until the ulcers were healed, then class 2 below-knee stockings were prescribed.

Primary endpoints were 24-week healing rates and 12-month recurrence rates.

Results:

60% had isolated superficial reflux, 25% mixed superficial and segmental deep reflux and 15% mixed superficial and total deep reflux. 40 patients were lost to follow-up.

There was no statistically significant difference in the 24-week healing rates between compression and surgery and com-

pression (65% vs 65%, [95% CI 0.77 to 1.24]). In total the 12-month ulcer recurrence rates were significantly reduced in the compression and surgery group (12% vs 28%, [95% CI -1.78 to -4.27]; $p < 0.0001$). The subgroup with total deep venous reflux showed no significant reduction of ulcer recurrence.

Conclusion:

Most patients with chronic venous ulceration will benefit from the addition of simple venous surgery to conventional compression treatment concerning a reduction of the 12-month ulcer recurrence.

Comment:

The results of this excellent study concerning the role of varicose vein surgery in patients with venous ulceration are in accordance with the publication of Guest M et al, *Phlebology* 2003; 18: 130–36, (see *Compression Bulletin* 06). However, in this latter study no follow-up was reported. As clearly demonstrated by the ECHAR-trial venous surgery in addition to compression treatment is a very reasonable approach in order to reduce the recurrence rate of ulcers. So, why wait with surgery until the ulcers are healed?

Gohel MS, Barwell JR, Wakely C, Minor J et al.

The influence of superficial venous surgery and compression on incompetent calf perforators in chronic venous leg ulceration.

Eur J Vasc Endovasc Surg 2005; 29: 78–82

Background:

Perforating vein incompetence may be reduced by surgery to superficial veins.

Methods:

This is a retrospective analysis of the Duplex data obtained by the ESCHAR trial.

Results:

146 from 261 legs were treated with compression alone and 115/261 underwent compression and superficial venous surgery. The compression group showed more legs with incom-

petent perforators at 12 months (77/131) compared to baseline (61/146, $p = 0.01$). Following surgery significantly fewer legs had incompetent calf perforators (59/115 vs 44/104 at 12 months, $p = 0.001$). New perforator incompetence developed in 36 from 131 legs after compression but only in 12/104 legs after surgery ($p = 0.003$).

Conclusion:

Surgical correction of superficial reflux may abolish incompetence in some calf perforators and offer protection against developing new perforator incompetence.

Comment:

The authors concede that some of the missing perforators in the follow up investigation after one year may have been destroyed by avulsion during surgery and that neither the site nor the diameter or the duration of reflux longer than one second has been evaluated in this study. However, the presented data support previous findings that abolishment of superficial

reflux is able to reduce the number of incompetent perforators. Interestingly, perforator incompetence was also reversed after compression alone in some instances. This study does not allow drawing conclusions regarding a pathophysiological role of incompetent perforators for the development of venous ulcers.

Gohel MS, Barwell JR, Earnshaw JJ, Heather BP et al

Randomized clinical trial of compression plus surgery versus compression alone in chronic venous ulceration (ESCHAR study) – haemodynamic and anatomical changes.

Br J Surg 2005; 92: 291–97

Background:

To evaluate the anatomical and haemodynamical effects of superficial venous surgery and compression on legs with venous ulceration.

Methods:

This is a subgroup analysis of the ESCHAR trial (see: Barwell JR et al, Lancet 2004; 363: 1854–59). Venous refill times (VRTs) were measured before treatment and at one year using photoplethysmography, with and without a narrow below-knee cuff inflated to 80 mmHg. Anatomical changes were assessed by the detection of venous refluxes using Duplex.

Results:

112 legs were treated with compression alone and 102 with compression and additional surgery. Deep refluxes were abolished by saphenous surgery in 10 of 22 legs with segmental deep reflux and in 3 of 17 with total deep reflux. However, from 57 patients with isolated superficial reflux 4 showed still residual reflux at the sapheno-femoral junction, 20 residual reflux above the knee, 24 below the knee and only in 9 legs the great saphenous reflux was abolished.

There was a statistically significant increase of median VRT one year after surgery from 10 (3–48) sec to 15 (4–48) sec ($p < 0,001$). Preoperative changes of VRT produced by the

tourniquet test showed a good correlation with the post-operative outcome.

Conclusion:

Despite co-existing deep refluxes saphenous surgery resulted in a significant haemodynamic benefit for patients with venous ulceration. One year after surgery a surprisingly high number of legs showed either residual or new superficial refluxes.

Comment:

This paper contains also very interesting information regarding the development of venous refluxes in superficial and deep veins after one year of compression therapy. 3 of 64 legs with isolated superficial refluxes developed new refluxes in the small saphenous vein, 8 in the deep veins. However, 5 legs with previous refluxes in the great saphenous vein were not present anymore. From 28 legs with superficial and segmental deep refluxes 10 developed total deep refluxes, but segmental deep refluxes were abolished in 7. In the 20 legs with superficial and total deep reflux, the superficial refluxes were unchanged after one year, and deep reflux was abolished in 2.

It may be discussed if the observed changes are in fact induced by long term compression and do not just reflect natural history. In any case they show a quite dynamic development of venous insufficiency.

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