Compression Bulletin 33

SIGVARIS

In this issue:

Eliciting patients' preferences for elastic compression stocking therapy after deep vein thrombosis: potential for improving compliance

This study was designed to investigate preferences for elastic compression stocking (ECS) characteristics among post-DVT patients and to identify any benefit/burden trade-offs made. Factors that may have influenced the results include the reimbursement of ECS therapy in the study country and the possibility of a lack of understanding of the PTS risk reduction characteristic.

Compression therapy – current practice of care: level of knowledge in patients with venous leg ulcers

At the first visit in a specialized wound care centre 31 % of venous leg ulcer patients were receiving no compression treatment, despite an average VLU duration of 13.6 months. The authors conclude that there is significant potential for improvement in the provision of compression therapy for VLU in Germany, and that one possible solution could be the standardized training of patients and healthcare providers.

Impact of compression stockings vs continuous positive airway pressure on overnight fluid shift and obstructive sleep apnea among patients on dialysis

This study was conducted to evaluate the short-term impact of wearing compression stockings (CS) or continuous positive airway pressure (CPAP) on the severity of obstructive sleep apnea (OSA) and fluid redistribution between legs and trunk in oliguric or anuric patients on hemodialysis. Both CPAP and CS treatment attenuated OSA severity in oliguric/anuric patients on hemodialysis.

A randomized crossover trial on the effect of compression stockings on nausea and vomiting in early pregnancy

This study aimed to evaluate the effect of compression stockings on symptoms of nausea, vomiting and dizziness between weeks 8 and 16 of pregnancy, as well as any impact on quality of life (QoL). At the end of the study: 50 % of patients felt that compression helped against nausea, 67 % confirmed compression helped against heavy legs, 62 % would continue to wear stockings or wear them again, > 80 % would recommend wearing compression stockings during the first weeks of pregnancy.

Congresses:

59th Annual Meeting of the German Society of Phlebology (DGP)	Stuttgart, Germany	September 20 – 23, 2017
18th Annual Meeting of the Swiss Society for Vascular Diseases (USGG)	Montreux, Switzerland	November 1 – 3, 2017
31th Annual Meeting of the American College of Phlebology (ACP)	Austin, Texas, USA	November 2 – 5, 2017
ICC Meeting	Paris, France	December 9, 2017

Stemmer Library on Phlebology and Compression Therapy
Published under the auspices of the UIP since 2001
www.stemmerlibrary.com

Twice a year, the Compression Bulletin presents a selection of the latest scientific publications in the field of phlebology and compression therapy. The annotated articles represent an excerpt from the Stemmer Library.
The Stemmer Library is the most comprehensive collection of scientific resources on phlebology and compression therapy. It was originally created by Dr. Robert Stemmer who was recognized as one of the most respected phlebologists of his time.
Today, the Stemmer Library is regularly updated with the latest scientific publications by a group of world-renowned experts in the field of phlebology.

Get online access to the Stemmer Library at
www.stemmerlibrary.com

SIGVARIS MANAGEMENT AG
CH-8401 Winterthur
Tel. +41 52 265 00 00
www.sigvaris.com

Bouman AC, Ten Cate-Hoek AJ, Dirksen CD, Joore MA

Eliciting patients' preferences for elastic compression stocking therapy after deep vein thrombosis: potential for improving compliance

J Thromb Haemost 2016;13:1-8

Aim
This study was designed to investigate preferences for elastic compression stocking (ECS) characteristics among post-DVT patients and to identify any benefit/burden trade-offs made.

Methods
A subset of the IDEAL DVT study population was enrolled to complete this discrete-choice experiment (DCE). In a DCE, patients are presented with a series of choice sets and results are based on the assumption that the patient chooses the option that gives them the highest personal satisfaction. In order to identify all the ECS characteristics that influence preference interviews were carried out with 6 patients who had 1 or more episodes of DVT and ECS experience, as well as discussions with experts. Eight characteristics were selected and defined as either benefit or burden:

Benefit:
- Post-thrombotic syndrome (PTS) risk reduction
- Reduction in current complaints

Burden:
- Comfort of wearing
- Appearance of the ECS
- Putting on the ECS
- Duration of ECS therapy
- Costs
- Ease of washing of the ECS

The questionnaires were sent between 3 and 6 months after DVT diagnosis, and were equally distributed between patients in the IDEAL DVT study who were receiving the intervention and the control treatment. Patients were presented with 9 choice-sets (18 sets were split into 2 versions) and asked to rank the characteristics in order of importance. Patients also provided information on whether someone was available to help them with donning/removing the stockings. The study continued until 300 completed questionnaires had been received.

Results
The questionnaires had a response rate of 81 %. Significant predictors of preference were: PTS risk reduction, putting on the ECS, duration of ECS therapy, reduction in current complaints, comfort of wearing the ECS and ease of washing the ECS. Cost and appearance had no significant impact on choice.

- Patients were willing to accept a 1-year increase in therapy duration in exchange for an additional 10 % in PTS risk reduction
- An increase in PTS risk of 29 % was acceptable in exchange for being able to don the ECS independently

Heterogeneity and interactions
Preference heterogeneity was significant for PTS risk reduction, and associated with education level and Villalta score. Patients with a higher level of education gave greater value to the attribute PTS reduction, as did patients with a higher objective Villalta score at 3-months.

Additional, hypothesis based, interactions were tested and found:

- Patients with a higher subjective Villalta score preferred an ECS with greater reduction in current complaints
- Patients who had no help available to don ECS preferred an ECS that could be put on independently
- Patients with a higher health-related quality of life score at 3 months more strongly preferred an ECS they could don independently

Conclusions

Factors that may have influenced the results include the reimbursement of ECS therapy in the study country and the possibility of a lack of understanding of the PTS risk reduction characteristic. However, the authors highlight the significant value of PTS reduction and independent donning of the ECS in patient preference. The interactions with other factors such as education level also highlight the need for individually tailored patient information when prescribing therapy.

Comments of the Editors

This is a sub-analysis performed in patients from an ongoing randomized controlled trial comparing two years ECS therapy to individually tailored duration of ECS therapy for the prevention of PTS ("IDEAL DVT study"). It is demonstrated that patients are willing to put on and to wear compression stockings if they are carefully instructed about the aim of this management.

The article shows that clear information to the patient about the potential benefits and possible problems are essential when a compression stocking is prescribed. Compression stockings should not be prescribed without a kind of awareness training and not sent to the patient by mail without showing and helping how to apply such stockings.

In the study, most important determinants of preference were PTS risk reduction and putting on the ECS. The treatment modalities in the acute stage of DVT seem to be extremely important: If patients experience the relief of pain and swelling due to proper compression in this acute stage of DVT, they will be motivated to continue compression to avoid such symptoms characterizing severe PTS during the coming months.

Protz K, Heyer K, Dissemond J, Temme B, Münter KC, Verheyen-Cronau I, Klose K, Hampel-Kalthoff C, Augustin M.

Compression therapy – current practice of care: level of knowledge in patients with venous leg ulcers

J Dtsch Dermatol Ges 2016;14(12):1273-1282

Aims
The objective of this study was to assess how some of the specifics regarding medical compression stocking (MCS) use are implemented in practice, and the level of knowledge about compression therapy of patients with venous leg ulcer (VLU).

Methods
This study was a nationwide, cross-sectional pilot study in patients with VLU. A questionnaire was developed and tested with 4 patients and wound experts. Patients were enrolled at first presentation at a participating institution with florid VLU and completed the questionnaire anonymously.

Results
From 92 centres, 177 patients were included in the study. Results show significant gaps in therapy provision and patient knowledge:

- 31 % of patients were receiving no compression treatment, despite an average VLU duration of 13.6 months.
- Patients had seen an average of 3.5 physicians previously for their VLU
- Only 46 % of patients on compression therapy performed daily leg exercises

Bandages:
- After initial treatment, bandages should be replaced with compression stockings, at approximately 3-4 weeks: bandages had been used for an average of over 40 weeks; 10 times longer than normally required
- Bandages need to be replaced regularly to ensure they can maintain therapeutic pressure; 50 % of patients used the same short-stretch bandages for ≥ 4 months
- 69 % of bandages had no underpadding and were thus insufficient
- Patient care of their bandages was also suboptimal: only 34 % used a mild detergent and 45 % dried bandages on a radiator causing damage to the material and thus the pressure it can exert

Stockings:
- 29 % of patients were receiving compression stocking therapy, with an average VLU duration of 22.3 months
- Only 14 % were prescribed CCL III class stockings, indicating that a large majority may be receiving inadequate compression
- Over 70 % of patients put their stockings on after getting up in the morning, missing the time of optimal leg decongestion
- Stockings should be washed every day; 19 % of patients changed their stockings daily

Conclusions
The authors conclude that there is significant potential for improvement in the provision of compression therapy for VLU in Germany, and that one possible solution could be the standardized training of patients and healthcare providers.

Comments of the Editors
The treatment of venous leg ulcers (VLU) is well studied in prospective randomized and controlled studies. Compression is recommended on a GRADE 1A level either with bandages or ulcer compression stockings. In a recent consensus the latter where demonstrated to be as effective as bandages in applicable patients (Rabe 2017). The present study shows that the national and international recommendations for VLU treatment are not realized in a big part of health care providers. 31% of 177 patients applying the first time in a wound care center in Germany were receiving no compression treatment, despite an average VLU duration of 13.6 months. If bandages where used, they were very often not replaced in an appropriate time. Only 29% of patients were receiving compression stocking therapy, with an average VLU duration of 22.3 months. Different compression classes were used but none of the patients was treated with specially designed two-layer ulcer stocking systems. These data show a large gap between the recommended VLU treatment and real life. The education of patients and health care professionals in this field must be intensified to improve the treatment results.

Rabe E, Partsch H, Hafner J, Lattimer C, Mosti G, Neumann M, Urbanek T, Huebner M, Gaillard S, Carpentier P. Indications for medical compression stockings in venous and lymphatic disorders: An evidence-based consensus statement. Phlebology. 2017 Jan 1:268355516689631. doi: 10.1177/0268355516689631. [Epub ahead of print]

SIGVARIS

Silva BC, Santos RSS, Drager LF, Coelho FM, Elias RM

Impact of compression stockings vs continuous positive airway pressure on overnight fluid shift and obstructive sleep apnea among patients on dialysis

Front Med 2017;4:57

Aim
This study was conducted to evaluate the short-term impact of wearing compression stockings (CS) or continuous positive airway pressure (CPAP) on the severity of obstructive sleep apnea (OSA) and fluid redistribution between legs and trunk in oliguric or anuric patients on haemodialysis.

Methods
In this randomized, crossover trial patients were assigned either CPAP titration or CS for 1 week and then switched to the other treatment. Patients were screened for OSA by Berlin questionnaire and confirmed by polysomnography (PSG). OSA was defined as apnea-hypopnea index (AHI) > 5 events/h.

Patients were required to have been receiving dialysis for at least 6 months, have residual diuresis < 500 ml/day, and have no history of treatment with CS or CPAP. Exclusion criteria included diagnosed heart failure, atrial fibrillation, chronic obstructive pulmonary disease or neoplasia; inferior limbs prosthesis or amputation; thrombosis of superior vena cava; presence of ascites or pleural diffusion. Haemodialysis was performed as prescribed by attending nephrologist with no changes during the study.

The assessment of OSA was carried out at a sleep laboratory. Obstructive apneas were defined as a cessation of airflow for at least 10s, and hypopnea as a ≥ 50 % reduction in airflow from baseline, yet above 0 for more than 10s. Body weight and fluid volumes were measured using segmental tetrapolar bioelectrical impedance while recumbent, before and after each PSG. Neck circumference was measured above the cricothyroid cartilage before bed and upon waking.

CPAP was titrated to optimal for each patient, specifically when the pressure eliminated apnea, hypopnea, desaturation, arousals, and snoring in a supine position. Below-the-knee CS were fitted, exerting an ankle pressure between 20 and 30 mmHg. Stockings were worn for 1 week, immediately upon awakening until just before going to sleep.

Results
Following screening, 14 patients completed the study protocol. Baseline OSA was moderate: AHI 20.8 events/h. AHI was reduced to 7.9 events/h during CPAP titration and 16.7 events/h after 1 week of CS treatment (both $p < 0.05$ vs baseline). Apnea-hypopnea time was also reduced, from 11.2 % at baseline to 4.3 % with CPAP and 8.1 % with CS ($p < 0.05$). However, CS also significantly increased the periodic limb movement index from 0 events/h to 8.9 events/h ($p < 0.05$). In contrast to CPAP, CS use resulted in no significant reduction in obstructive apnea index or hypopnea index.

Neck circumference was similar at nocturnal measurement, but both treatments resulted in a significant reduction overnight; from an increase of 0.7 cm at baseline to -1.0 cm with CPAP and -0.4 cm with CS ($p < 0.05$).

Fluid distribution was affected by both treatments; CS use increased trunk total water content before sleep compared to baseline, and reduced trunk extracellular water content compared to CPAP ($p < 0.05$), indicating a shift of the excess fluid to the intracellular compartment.

Conclusions
Both CPAP and CS treatment attenuated OSA severity in oliguric/anuric patients on haemodialysis, although the effect was greater with CPAP. The benefits of CS use are likely to be a result of the shift of fluid intracellularly, avoiding the overnight movement of extracellular fluid to the neck; while CPAP therapy exerts local pressure which prevents fluid from reaching the neck. The authors recognise the need for further studies of larger sample size and longer treatment period, but conclude that CS therapy may be an alternative to CPAP for the attenuation of OSA in haemodialysis patients.

Comments of the Editors
Obstructive sleep apnea, frequently associated with daytime fatigue, snoring, obesity and leg swelling may be caused by several underlying conditions like obesity, pulmonary hypertension, neurological diseases but also by renal insufficiency, as described in this article. A positive influence of wearing compression stockings during daytime was reported in different studies and explained by reducing the amount of fluid available for the displacement into the neck overnight, assuming that overnight fluid displacement into the neck plays a causative role in OSA. Using bio impedance this study shows that wearing CS prevented fluid movement from the lower limbs to the trunk and from the intracellular to the extracellular space of the trunk. Keeping more fluid in the intracellular space, the likelihood that it moves freely into other regions of the body is reduced. Less free fluid will reach the neck in the recumbent position, which partially prevents the edema buildup in upper airway during the night.
Sedentary living promotes dependent fluid accumulation in the legs that can be counteracted by compression of the legs. This study points to an important effect of compression stockings which has been underestimated up to now, consisting in an extravascular fluid shift from the legs towards the trunk. This effect is probably more important compared to the minor shift of blood volume induced by a 20-30 mmHg stocking in the upright position.

SIGVARIS

Mendoza E and Amsler F

A randomized crossover trial on the effect of compression stockings on nausea and vomiting in early pregnancy

Int J Womens Health 2017;9:89-99

Aims
This study aimed to evaluate the effect of compression stockings on symptoms of nausea, vomiting and dizziness between weeks 8 and 16 of pregnancy, as well as any impact on quality of life (QoL).

Methods
This was a randomized, open, crossover trial in which pregnant women aged >18yrs with mild to moderate nausea and vomiting in early pregnancy (NVP) received 2 weeks of compression stocking therapy followed by 2 weeks without; or the reverse. This design allowed for natural reduction in NVP with pregnancy progression. Two pairs of appropriately sized calf compression stockings were supplied with ankle pressure of 23-32 mmHg, along with instructions to wear them for a minimum of 5 waking hours a day.

The primary endpoint was a change in the Nausea and Vomiting in Pregnancy Quality of Life (NVPQOL) score between baseline and the end of each period (with and without compression). Secondary endpoints were changes in dizziness, chronic venous disease quality of life (CIVIQ) and Pregnancy-unique Quantification of Emesis and Nausea (PUQE) score.

Results
Of 74 women enrolled, 58 completed the study. Mean age was 31.7 yrs and mean gestational week was 9 weeks and 3 days. Compliance was 100 %, with participants reporting use of the stockings for > 8hrs on 7 days and 5-8 hrs on the remaining days of the 2 weeks.

Mean scores for all NVPQOL domains improved from baseline, with greater improvement for the period with compression stockings. Mean change in total score was significantly greater after compression than without (-36.67 vs -21.68, respectively; $p < 0.001$). Patients also reported fewer periods of dizziness with compression than without (mean change from baseline -3.22 vs -0.44, respectively; $p < 0.001$).

Data from the second week of each period for the PUQE questionnaire were compared and showed that compression significantly reduced the mean scores for nausea, retching, circulatory disturbance and total score.

Mean change from baseline in total CIVIQ score was significant after compression (-4.46) vs the period without compression (1.39).

At the end of the study:

- 50% of patients felt that compression helped against nausea
- 67 % confirmed compression helped against heavy legs
- 62 % would continue to wear stockings or wear them again
- > 80 % would recommend wearing compression stockings during the first weeks of pregnancy

Conclusions
The authors compared results for the patients with moderate to severe NVP (PUQE score >6) to pharmacological intervention studies using PUQE scores, reporting that 'the difference between compression and placebo in these patients was at least equal to that observed following the use of medication'. Doctors Mendoza and Amsler thus conclude that compression warrants further investigation as a tool to alleviate nausea and vomiting in early pregnancy.

Comments of the Editors
If we think about compression treatment very often hemodynamic issues are foreground. However, compression influences many functions including inflammation and subjective symptoms in vascular patients. In this paper the authors could demonstrate two things: 1. wearing compression stockings can improve nausea and vomiting in early pregnancy and 2. wearing compression reduces feeling of heaviness in the legs in the same patients. The second result confirms the findings in other studies and the indication for compression stockings in symptomatic pregnant women (Thaler 2001). In the present study 62 % of the study participants would continue to wear compression stockings or wear them again. The positive influence on dizziness, nausea and vomiting is completely new and the authors speculated that it might be explained by an influence of compression on calf blood volume and heart rate changes when standing up. The final reason for these findings remains unknown and the results warrant further scientific studies in this field.

Thaler E. Huch R. Huch A. Zimmermann R. Compression stockings prophylaxis of emergent varicose veins in pregnancy: a prospective randomised controlled study. Swiss Medical Weekly. 2001;131:659-62