Following Varicose Vein Surgery, Should Elastic Compression Bandages or Graduated Compression Stockings Be Preferred ?

Varis Ameliyatı Sonrasında Elastik Kompresyon Bandajları mı, Basınçlı Kompresyon Çorapları mı Tercih Edilmelidir?

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ABSTRACT Objective: A standardized protocol is stil lacking regarding the type and the duration of compression therapy established after surgical treatment of venous diseases of lower extremities. The aim of this study was to compare the effectiveness of elastic compression bandages and graduated compression stockings for compression therapy following surgical intervention. **Material and Methods:** Following complete stripping of the greater saphenous vein and phlebectomy operations of lower extremities, non-adhesive elastic crepe bandages were applied to 32 patients in the 1st group and graduated compression stockings (30-40 mmHg) to antoher 32 patients in the 2nd group for 20 days. The groups were compared regarding the results of treatments. **Results:** No significant difference was found between the 2 groups in terms of hemorrhage and thrombosis formation. For swelling and wound formation in the extremity, the results were significantly in favor of graduated compression stockings (p= 0.039) and in terms of slipping down and usage difficulties, significantly in favor of the 2nd group as well (p= 0.000, p= 0.024 respectively). **Conclusion:** According to this study evaluating the results of usage difficulties and complication rates, graduated compression stockings may be recomended in place of elastic compression bandages in compression therapies following lower extremity vein operations.

Key Words: Venous insufficiency; varicose veins; bandages; stockings compression; saphenous vein

ÖZET Amaç: Alt ekstremite venöz hastalıkların cerrahi tedavileri sonrasında yapılacak olan kompresyon uygulamasının tipi ve süresi hakkında henüz standart bir protokol bulunmamaktadır. Bu çalışmanın amacı; cerrahi girişim sonrasındaki kompresyon uygulamalarında, elastik kompresyon bandajları ile basınç dereceli kompresyon çoraplarının etkinliğini karşılaştırmaktır. **Gereç ve Yöntemler:** Yapılan "büyük safen ven komplet stripping ve flebektomi" ameliyatı sonrasında; 1. gruptaki 32 hastaya 20 gün süreyle non-adeziv elastik krep bandajlar uygulandı. İkinci grubu oluşturan yine aynı sayıdaki hastaya aynı süre ile 30-40 mmHg basınçlı kompresyon çorapları kullandırıldı.Gruplar tedavi sonuçlarına göre karşılaştırıldı. **Bulgular:** Tromboz oluşumu ve kanama açısından gruplar arasında anlamlı farklılık bulunamadı. Ekstremitede şişlik ve yara oluşumu değerlendirildiğinde, sonuçlar anlamlı olarak basınçlı kompresyon çoraplarının kullandırıldığı grup lehine idi.(p= 0.039) Aşağı kayma ve kullanma zorluğu yönünden de, yine 2. grup lehine anlamlı sonuçlar belirlendi. (sırasıyla p= 0.000, p= 0.0024). **Sonuç:** Komplikasyon oranları ve kullanım güçlüğü ile ilişkili sonuçların değerlendirildiği bu çalışmaya göre; alt ekstremite venöz hastalıkların cerrahi tedavileri sonrasında yapılacak olan kompresyon uygulamalarında elastik kompresyon bandajları yerine basınç dereceli kompresyon çorapları önerilebilir.

Anahtar Kelimeler: Venöz yetmezlik; varis; bandaj; kompresyon çorapları; safen ven

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Varicose veins of the lower extremities are present in approximately 50% of women. Varicose veins disturb women with their bad appearance, in addition to complaints like pain, restlessness, and com-

plications such as pulmonary emboli, venous thrombosis and venous ulceration. Compression bandages and graduated compression stockings have a major role for the treatment of venous diseases. Since 1848, the first use of rubber materials for stockings, various elastic bandages and stockings have been developed. Later, elastic compression products have been used for the treatment of venous diseases and have achieved successful results.[1] Compression therapy is recommended in venous insufficiency, deep vein thrombosis and its prevention, post-thrombotic syndrome, treatment of venous ulcers, as well as surgical and non-surgical treatment of varicose veins.[2-4]

The goal of treatment in venous diseases is to achieve perfect results both physiologically and cosmetically by using a comfortable method. Although various newer treatment methods have started to be used in spite of surgical operations, such as foam sclerotherapy, radiofrequency and endovenous laser ablation, the most well known treatment method of varicose veins is still stripping and phlebectomy. Although compression bandages or graduated compression stockings are used to prevent postoperative thrombosis and hemorrhage, no standardization has been established yet on certain issues regarding which material and pressure degree should be preferred and the duration of compression.[5,6] In addition to their advantages, unpredicted results due to their usage and difficulties faced by the patients should be considered for the choice of the compression instrument. The aim of this study was to compare the treatment success of the graduated compression stockings with elastic compression bandages following varicose vein surgery.

MATERIAL AND METHODS

Sixty-four patients who were operated with the diagnosis of complete insufficiency of the greater saphenous vein and varicose veins were included in this study. The number of operated extremities was 68. According to the Community Emergency Assistance Program (CEAP) classification, patients were either class C2 or C3. Patients with higher grade were not included in the study. Venous Doppler ultrasonography and duplex scanning were performed to all patients for diagnosis. Greater saphenous vein insufficiency and incompetence at the saphenofemoral junction were determined in all patients in both groups. Since distal artery pulses were palpable on physical examination, there was no need to perform arterial Doppler investigation to any of the patients. In all cases high ligation, disconnection, complete stripping of the greater saphenous vein and mini phlebectomies were performed. General anesthesia was preferred. Thromboprophylaxis with low-molecular-weight heparin was done in all patients. Patients operated by another procedure or on a different vein and cases with a history of operation were excluded from the study. This study was run between February 2002 and October 2003. The patients were informed preoperatively on the compression modalities following surgery, and they were divided into two groups according to patient preference. Each group consisted of 32 operated patients and the number of operated extremities was 34. Foam pads and non-adhesive elastic crepe bandages were applied to patients in both groups after the operation. First dressing was performed at 24 hours. Same non-adhesive elastic crepe bandages were maintained in patients in the first group. While the patient was in supine position with the leg elevated, classical elastic crepe bandages were applied starting from the dorsal part of the foot up to the high-thigh region as 2 layers. Two rolls of 10 cm wide and 150 cm long bandages were used up to the suprapopliteal region, and one or two rolls of 12 cm wide bandages were applied to the thigh according to the length of the extremity. The elastic bandages were fixed at the groin region with hypoallergic dressing retention sheets. The bandages were applied to all patients by the author himself. When a patient presented to the hospital complaining from slipping down of bandages, the same well-trained experienced nurse reapplied the bandages. For the patients in the second group, class II (30-40 mmHg) compression stockings were used following the wound dressing. All patients were mobilized in the morning at post-

operative day one. Compression duration was 20 days for both groups. The patients were permitted to take the bandages or the stockings off every three days to go for a shower. The bandages or the stockings were left on the extremity during the days and nights. When there was a need to renew the bandages of the patients in first group, they were referred to the same nurse at the hospital.

Statistical comparisons were made using the Chi-square and Fisher's exact tests. More than 20% of the expected count must not be less than 5 to perform the chi-square test. Otherwise, the Fisher's exact test was used. A "p" value of smaller than 0.05 was considered statistically significant.

RESULTS

The mean age of the patients in the 1st and 2nd groups was 38.9 and 39.5 respectively. There was no difference between the 2 groups in terms of weight, gender, family history and history of continuous standing position. The mean number of varicose veins, which were excised by phlebectomy was 4.0 and 4.3 for the patients in the first and second groups respectively (Table 1). The most common symptoms during their presentation were pain, cramp, cosmetic appearance and edema. The other symptoms at presentation were restlessness and tiredness in legs, traction, numbness, pruritus, pigmentation, heavy feeling legs, burning sense, uncomfortable stepping, and tenderness. No statistical difference was present between the patients in both groups regarding symptoms at the time of presentation (p> 0.05). These symptoms were shown in Table 2.

TABLE 1: Patients characteristics.

	Group I (n= 32)	Group II (n= 32)
Mean age (years)	38.9 (21-79)	39.5 (26-64)
Weight (kg)	68.0 (51-95)	68.6 (54-110)
Female/Male	24/8	25/7
Family history	18	22
Work in standing position	8	9
Excised varicose veins	4.0 (2-10)	4.3 (1-11)

TABLE 2: Symptoms of patients.

	Group I (n= 32)	Group II (n= 32)
Pain	27	23
Cramps	10	13
Cosmetic appearances	13	11
Edema	11	10
Tiredness, restlessness	7	7
Traction	2	4
Numbness	1	2
Pruritus	2	4
Pigmentation	2	2
Burning sense	2	2
Heavy feeling legs	1	1
Uncomfortable stepping	1	1
Tenderness	1	1

When the compression duration of three weeks for elastic compression bandage or graduated compression stockings was expired, the objective results and subjective complaints of patients from both groups were determined (Table 3). These results were evaluated statistically. Postoperatively, in 9 (28.1%) patients in the 1st group and in 14 (43.7%) patients in the 2nd group, no negative sign or subjective complaint was present. Although statistically insignificant, while there was no venous thrombosis or telangiectatic matting in any of the 2nd group patients, four patients manifested one of those 2 unpredicted results in the 1st group. Thrombosis was diagnosed by color Doppler ultrasonography in 2 patients who had pain at the popliteal region and calf at the end of 20 days of compression, although they had no thrombosis sign on their physical examination. Two patients who had popliteal and calf vein thrombosis were treated with nadroparin once daily and later with warfarin for 3 months. Doppler ultrasound examination showed recanalization and the complaints were relieved at the end of three months. Telengiectatic matting was observed in another 2 patients in the first group. Results regarding the presence of edema and wound formation due to irritation of compression material were significantly in favor of the stocking group (p= 0.039). Skin laseration and ulcera-

TABLE 3: Problems at the extremities after surgery.

	Group I (n= 34)	Group II (n=3 4)
Physical signs		
Ecchymosis/small hematoma	9	6
Thrombosis	2	0
Swollen limb	8	2*
Inflammation	7	4
Telangiectatic matting	2	0
Wound formation	8	2*
Complaints		
Postoperative pain	6	4
Paresthesia	4	4
Pruritus	6	5
Discomfort	8	5
Slipping down	13	0**
Unable to complete time	1	0
Days off work	12	6
Tightness	12	10
Usage difficulty	21	12***
Total patients without problem	9	14

*p= 0.039
**p= 0.000
***p= 0.024

tion with blisters or crusting were named wound formation. Results in terms of slipping down from the extremity and usage difficulties were in favor of the second group as well (respectively; p= 0.000, p= 0.024).

DISCUSSION

Following surgical operations performed due to superficial venous insufficiency and varicose veins of the lower extremities limb compression is always used. Compression may be applied by compression bandages or graduated compression stockings. The main purpose of this is to prevent hemorrhage, hematoma and formation of thrombosis.[7,8] In addition, postoperative limb compression is used after surgery to reduce edema and pain.[9] Elastic compression bandages and graduated compression stockings after varicose vein surgery proved effective for the prevention of secondary bleeding and development of thrombosis. Lower incidence of thrombosis in the stocking group has been shown.[10] According to the results of our study, both compression instruments may be considered successful. The difference between groups for preventing hemorrhage and thrombosis was not statistically significant. Probably due to bandage application, thrombosis developed in 2 patients in the 1st group and they were medically treated for three months. These 2 patients experienced the same difficulties when they were using postoperative compression bandages. Both believed that they could solve this problem without calling the hospital. However, due to increasing complaints, they were evaluated at the hospital and were treated with the diagnosis of venous thrombosis. No thrombosis developed in the stocking group. There was no significant difference between the 2 groups for development of thrombosis. The success of bandage application is highly dependent on the physician and the patient. The degree of compression is more variable with elastic bandages along the extremity than with graduated stockings. A study performed by the surgeons of the French speaking Vascular Surgery Society to understand their choices for compression therapy achieved very interesting results. After the surgeons evaluated the advantages and disadvantages of compression bandages and compression stockings, they decided to start compression therapy with long stretch elastic bandages at the end of the operation at a rate of 87% and after bandage therapy they continued to make compression with compression stockings for 8-30 days.[11] Serious side effects may develop if compression of bandage is not appropriately adjusted. On the contrary, bandages used for preventing thrombosis may lead to thrombosis themselves and may damage arterial circulation. If distal artery pulse of the patient is not palpable, the patient should be evaluated by Doppler ultrasonography before compression therapy. Since compression bandages are nongraduated, they carry the risk of serious effects on the arterial system. If arterial circulation is not adequate, serious skin necrosis with an eventual loss of the extremity may develop. [12,13]

Subcutaneous hematoma formation is a major complication after varicose vein surgery. Postoperative compression may reduce hematoma and improve postoperative comfort with a good cosmetic result. It may also prevent

recurrence and recanalization of veins. Since elastic compression bandages may be inadequate to reduce postoperative secondary bleeding and hematoma due to the slipping down problem, compression stockings were recommended.[8,9] In our study also, the results were in favor of compression stockings group with 6 patients compared to 9 patients in terms of small hematoma and eccyhmosis formation.

The application of compression bandages to the lower extremities was shown to produce a non-uniform gradient of compression, which is variable and has a limited duration. Furthermore, compression with stockings was reported to maintain a stable compression and thus it proved more effective in venous diseases.[14] Compression effect might be lost at different degrees with time according to the compression instrument during the compression period. While compression by crepe bandages loses its initial compression effect by 49% within 24 hours, elastocrepe bandages lose their initial compression effect by 60%. This rate is only 10% in high-pressure compression stockings. In addition, while bandages can easily roll/slip down, their compression effect differs over the leg.[15] The duration of effective compression using crepe bandaging is too short due to slipping down; the pressure may fall to zero within a few hours after the application of bandages.[16] Our study also showed that the slipping down problem of bandage application was a major one. Patients with bandages have trouble to continue with their daily life and go back to work for longer periods. Regarding patient complaints, while there was no difference between the 2 groups in terms of pain, paresthesia, pruritus and tightness, the results were highly in favor of stockings in this study, when they were compared for difficulty of application. Patients can use their stockings without help from a nurse and visit the clinic to have them reapplied. The patient accepts and tolerates stockings more easily than bandages.[6,10] Extremity edema developing at the end of the compression and the wound dressings due to the irritating effect of the compression instrument is significantly less in graduated compression stockings group compared to the elastic bandage group. The graduated compression stockings are also successful to prevent thrombosis and hemorrhage. Moreover, a study showed that even after a long period of time after the operation, no objective or subjective venous insufficiency sign was observed in patients who had used compression stockings.[7] The most common compression stockings are class II (30-40 mmHg) stockings throughout the world.[1] Compression stockings are preferred for compression therapy, because of the low rates of postoperative problems, analgesic need, days off work and high rates of patient satisfaction with the cosmetic results. However, compression stockings may fail in some patients due to various reasons such as cutting off circulation, too hot to wear, unable to use without help, contact dermatitis, cosmetic concerns and others.[17] On the other hand, after the meeting of the International Compression Club for consensus on compression therapy, scientists declared that the type and duration of compression were unclear yet, and they still required clarification.[18]

CONCLUSION

Compression stockings can be preferred over elastic bandages for compression therapy to be used following vein surgery for their success, lower complication rates and easy-to-use features. Graduated compression stockings are efficient instruments and more comfortable than elastic compression bandages.

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