Graduated Compression Stocking Thromboprophylaxis for Elderly Inpatients

A Propensity Analysis

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BACKGROUND: Graduated compression stockings (GCS) are often used for deep vein thrombosis prophylaxis in nonsurgical patients, although evidence on their effectiveness is lacking in this setting.

OBJECTIVE: To determine whether prophylaxis with GCS is associated with a decrease in the rate of deep vein thrombosis in nonsurgical elderly patients.

METHODS: Using original data from 2 multicenter nonrandomized studies, we performed multivariable and propensity score analyses to determine whether prophylaxis with GCS reduced the rate of deep vein thrombosis among 1,310 postacute care patients 65 years or older. The primary outcome was proximal deep vein thrombosis detected by routine compression ultrasonography performed by registered vascular physicians.

RESULTS: Proximal deep vein thrombosis was found in 5.7% (21/371) of the GCS users and in 5.2% (49/939) of the GCS nonusers (odds ratio [OR], 1.09; 95% confidence interval [CI], 0.64–1.84). Although adjusting for propensity score eliminated all differences in baseline characteristics between users and nonusers, the OR for proximal deep vein thrombosis associated with GCS remained nonsignificant in propensity-stratified (adjusted OR, 1.11; 95% CI, 0.59–2.10) and propensity-matched (conditional OR, 0.92; 95% CI, 0.42–2.02) analysis. Similar figures were observed for distal and any deep vein thrombosis. The rates of deep vein thrombosis did not differ according to the length of stockings.

CONCLUSIONS: Prophylaxis with GCS is not associated with a lower rate of deep vein thrombosis in nonsurgical elderly patients in routine practice. Randomized studies are needed to assess the efficacy of GCS when properly used in this setting.

KEY WORDS: aged; bandages; inpatients; prevention and control; venous thrombosis.

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Graduated compression stockings (GCS) are a mechanical method of prophylaxis against deep vein thrombosis used in various settings.^{1–3} Although their mechanism of action is probably multifactorial,⁴ GCS exert graded circumferential pressure from distal to proximal segments of the lower limbs, increasing venous outflow and reducing stasis within the leg veins.⁵ Their use is recommended in patients

who are at high risk of bleeding or as an adjunct to anticoagulant-based prophylaxis.⁶

There is evidence demonstrating that GCS reduce the risk for deep vein thrombosis when used properly in surgical patients.^{5,7} In contrast, only a few studies have evaluated GCS in nonsurgical patients.⁶ In a prospective study of 80 elderly patients with acute myocardial infarction, the incidence of deep vein thrombosis was significantly decreased in lower limbs treated with GCS, using the other limb as a control.⁸ A randomized controlled trial failed to show a significant reduction in deep vein thrombosis for 65 patients wearing GCS after a stroke.⁹ Hence, further studies are needed to assess the effectiveness of GCS alone or in combination with anticoagulant-based prophylaxis in the nonsurgical setting.^{5,10}

The aim of this study was to compare the frequency of deep vein thrombosis between GCS users and nonusers among nonsurgical inpatients 65 years or older with restricted mobility.

PATIENTS AND METHODS

Study Design

We pooled the original data from 2 observational studies of risk factors, prophylaxis, and prevalence of deep vein thrombosis in elderly patients hospitalized in 50 French postacute care departments in 2001 and 2003. Descriptions of the design and the primary outcomes of these 2 studies have been reported elsewhere.^{3,11} The same inclusion criteria, data collection forms, and diagnostic procedure were used for the 2 studies. Although the 2 study populations differed with regard to chronic heart failure (13% vs 21%, $P < .001$), chronic respiratory failure or obstructive pulmonary disease (3% vs 9%, $P < .001$), and prior history of venous thromboembolism (12% vs 8%, $P = .03$), we did not find any significant first-order interaction between study year and patient baseline characteristics for the use of GCS. By pooling the data from the 2 studies, we extended the generalizability of our findings owing to the broad spectrum of patients analyzed and we increased statistical power for comparisons between GCS users and nonusers. The Institutional Review Boards at Grenoble University Hospital and Amiens University Hospital approved the studies

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and all enrolled patients provided written informed consent for participation.

Patients

All patients 65 years of age or older who were admitted to the participating postacute care facilities were eligible. Hospital-based postacute care departments receive patients who typically have complicated conditions and require specialized care, rehabilitation services, or other services associated with the transition between short-stay hospital care and home.¹² Thirty-seven participating facilities were skilled nursing care facilities and 30 were located in nonteaching hospitals (Table 1). Patients were excluded from the study if they had a positive diagnosis of deep vein thrombosis or pulmonary embolism at admission or if they required long-term anticoagulant therapy with heparin or vitamin K antagonist for reasons other than venous thromboembolism prophylaxis. As the present analysis focused on the efficacy of GCS in preventing deep vein thrombosis in nonsurgical patients, we also excluded patients who had undergone hip or knee replacement within the previous 6 weeks or other major surgical procedures within the previous 4 weeks.

Data Collection

Physicians collected sociodemographic data, risk factors for venous thromboembolism, and treatments using a case report form. Transient risk factors for venous thromboembolism included acute immobility (defined as confinement to bed or armchair for less than 30 days), stroke within the previous 4 weeks, NYHA class III or IV congestive heart failure, exacerbation of chronic obstructive pulmonary disease or acute respiratory failure that did not require ventilatory support, and acute infection.^{13,14} Chronic risk factors included prolonged immobility for 30 days or more, history of deep vein thrombosis or pulmonary embolism, history of myocardial infarction, chronic heart failure, chronic obstructive pulmonary disease or chronic respiratory failure, hemiplegia lasting more than 4 weeks, cancer, varicose veins, inflammatory disorders (such as arthritis, connective tissue disease, and inflammatory bowel disease), hormone therapy, and obesity (defined as body

mass index ≥ 30 for men and ≥ 28.6 for women).¹³ Thrombophilia was not documented for the vast majority of patients and therefore was not analyzed. Data on medical treatments included therapy with aspirin or other antiplatelet agents, prophylaxis with unfractionated or low-molecular-weight heparin or oral anticoagulant, and physical therapy.

Prophylaxis with GCS

We identified patients wearing GCS and we categorized the GCS length as below-knee or thigh-length. We assessed the total duration of GCS use and whether GCS were used during the day or longer. The GCS users were defined as patients who wore below-knee or thigh-length GCS for daytime hours or more. Given the observational nature of this study, physicians in charge of patients ordered prophylaxis with GCS autonomously.

Study Outcomes

Our primary outcome was proximal deep vein thrombosis defined as thigh or popliteal deep vein thrombosis diagnosed with routine ultrasonography. All patients underwent comprehensive compression ultrasonography performed by registered vascular medicine physicians who were unaware of both risk factors and thromboprophylaxis. As described previously,¹⁵ all deep veins of the lower limbs were examined from the inguinal ligament to the malleolus, using a 3 to 7.5 MHz transducer. Only incompressible veins with a thrombus of an anteroposterior diameter of 5 mm or more were considered positive. Our secondary outcomes were distal deep vein thrombosis and any deep vein thrombosis. Distal deep vein thrombosis was defined as isolated calf deep vein thrombosis (including gemellar and soleal vein thrombosis).

Statistical Analysis

Baseline characteristics for GCS users and nonusers were compared using the χ^2 or Fisher exact tests for categorical variables and the Wilcoxon rank sum test for continuous variables. We estimated the odds ratios (ORs) of deep vein thrombosis and their corresponding 95% confidence intervals (CIs) for GCS users compared with nonusers. Because of the lack of randomization, patients with specific characteristics were more likely to use GCS. As these characteristics might be related to the occurrence of deep vein thrombosis, a direct comparison between GCS users and nonusers would have been biased. We therefore performed multivariable logistic regression to adjust for sex, age, study year, transient and chronic risk factors for venous thromboembolism, contraindication to anticoagulant treatments, physical therapy, pharmacological prophylaxis (i.e., prophylaxis with unfractionated or low-molecular-weight heparin, or vitamin K antagonist), and therapy with aspirin or other antiplatelet agents. We used 2-level logistic regression to account for patient clustering within departments.¹⁶ We used a first-order interaction term to assess whether the efficacy of GCS was different for patients with and without pharmacological prophylaxis. Nine patients were excluded from multivariable analysis because of missing data for 1 or more covariates.

In addition to multivariable analysis, we performed a propensity score analysis to adjust for imbalances in baseline characteristics between GCS users and nonusers. Propensity

Table 1. Characteristics of Postacute Care Departments Participating in the Study

	No. (%)		Percentage of Graduated Compression Stocking Users, Median (Interquartile Range)
	Departments* (n=50)	Patients (n=1,310)	
Type of department			
Skilled nursing care	37 (74)	1,014 (77)	19 (8 to 30)
Rehabilitation	13 (26)	296 (23)	50 (27 to 64)
Teaching status			
Nonteaching	30 (60)	679 (52)	20 (11 to 33)
Teaching	20 (40)	631 (48)	29 (9 to 57)
Department size, no. of beds			
≤ 40	36 (72)	857 (65)	22 (11 to 55)
> 40	14 (28)	453 (35)	24 (8 to 30)

*Of the 50 departments that participated in the project, 33 participated in both studies, 8 participated only in the 2001 study, and 9 participated only in the 2003 study.

analysis attempts to compare outcomes between patients who have a similar distribution of measured covariates, and in this way approximates the conditions of random treatment assignment.¹⁷ For this purpose, we first developed a full non-parsimonious 2-level logistic regression model to derive a propensity score for GCS use that included sex, age, study year, transient and chronic risk factors for venous thromboembolism, contraindication to anticoagulant treatments, physical therapy, pharmacological prophylaxis, and therapy with aspirin or other antiplatelet agents. This model yielded a c-statistic of 0.83 and a Hosmer–Lemeshow goodness-of-fit statistic of 6.01 ($P=.64$). The propensity score ranged from 0.01 to 0.97 and reflected the conditional probability of a patient's using GCS given his characteristics. Patients were stratified into 7 strata according to their propensity score. We then estimated the ORs of deep vein thrombosis associated with GCS use after adjusting for the strata of propensity score. To compare outcomes among patients with an equivalent likelihood of GCS use, we also defined a restricted cohort of users and nonusers matched by their propensity score.¹⁸ We estimated the ORs of deep vein thrombosis associated with GCS for propensity-matched patients using conditional logistic regression. This approach is similar to that reported in previous observational studies.¹⁹ Two-sided P -values of less than .05 were considered statistically significant. Analyses were performed using Stata version 9.0 (Stata Corporation, College Station, TX) and MLWin 2.0 (Institute of Education, London, U.K.).

RESULTS

Study Population

Of 2,136 patients screened for eligibility, 1,664 were enrolled in the 2 studies (852 in 2001 and 812 in 2003). The main reasons for nonenrollment were long-term anticoagulant therapy with heparin or vitamin K antagonist for reasons other than venous thromboembolism prophylaxis (179 patients), age less than 65 years (138 patients), positive diagnosis of venous thromboembolism at admission (113 patients), and refusal to participate (42 patients). After excluding 354 patients who had undergone hip or knee replacement within the previous 6 weeks or other major surgical procedures within the previous 4 weeks, the study population comprised 1,310 nonsurgical patients. The median number of patients enrolled per department was 21 (interquartile range [IQR], 13–37).

Patient Characteristics

Women comprised 65% of all patients, the median age was 82 years (IQR, 77–88), and the median length of stay in the acute care department before admission was 16 days (IQR, 9–28). The most common risk factors for venous thromboembolism were immobility (either acute [12%] or prolonged [38%]), chronic heart failure (17%), varicose veins (16%), cancer (12%), and a history of venous thromboembolism (10%). A total of 371 patients (28%) used GCS for daytime hours or

Table 2. Baseline Characteristics for Graduated Compression Stocking Users and Nonusers

Characteristics	Graduated Compression Stockings		P Value
	Users (n=371)	Nonusers (n=939)	
Age, median (IQR), y*	83 (78 to 89)	82 (76 to 88)	.13
Women, no. (%)	270 (73)	583 (62)	<.001
Enrolled in 2003, no. (%)	211 (57)	436 (46)	.001
Transient risk factors for venous thromboembolism, no. (%)			
Acute immobility <30 d	59 (16)	104 (11)	.02
Stroke <4 wk	9 (2.4)	19 (2.0)	.65
Acute respiratory failure	18 (4.8)	43 (4.6)	.83
NYHA class III or IV congestive heart failure	10 (2.7)	21 (2.2)	.62
Acute infectious disease	39 (10)	89 (9.5)	.57
Chronic risk factors for venous thromboembolism, no. (%)			
Prolonged immobility ≥ 30 d	150 (40)	344 (37)	.20
History of deep vein thrombosis or pulmonary embolism	54 (15)	80 (8.5)	<.001
Hemiplegia ≥ 4 wk	39 (10)	91 (9.7)	.65
History of myocardial infarction	21 (5.7)	47 (5.0)	.63
Chronic respiratory failure or obstructive pulmonary disease	22 (5.9)	61 (6.5)	.70
Chronic heart failure	55 (15)	168 (18)	.18
Cancer	38 (10)	120 (13)	.20
Varicose veins	73 (20)	134 (14)	.02
Hormone therapy	13 (3.5)	18 (1.9)	.09
Inflammatory disorder	14 (3.8)	23 (2.4)	.19
Obesity	31 (8.4)	81 (8.6)	.87
Treatments, no. (%)			
Aspirin	59 (16)	164 (17)	.50
Other antiplatelet agents	34 (9.2)	58 (6.2)	.06
Low-risk dose of low-molecular-weight heparin†	61 (16)	184 (20)	.19
High-risk dose of low-molecular-weight heparin†	130 (35)	218 (23)	<.001
Unfractionated heparin	4 (1.1)	6 (0.6)	.48
Oral anticoagulant	4 (1.1)	6 (0.6)	.48
Physical therapy	231 (62)	365 (39)	<.001
Contraindication to anticoagulant treatment	12 (3.2)	20 (2.1)	.24

*Age and gender were missing for 9 and 2 patients, respectively.

†Low-molecular-weight heparin at the low-risk dose included dalteparin 2,500 U/d, enoxaparin 2,000 U/d, nadroparin 1,900 U/d, and reviparin 1,432 U/d, whereas the high-risk dose included dalteparin 5,000 U/d, enoxaparin 4,000 U/d, nadroparin 2,850 U/d, and tinzaparin 4,500 U/d.

longer. Of the 309 (83%) users for whom the length of GCS was specified, 70% (216/309) wore below-knee stockings and 30% (93/309) wore thigh-length stockings. The median duration of GCS use was 34 days (IQR, 17–60). GCS users were more likely to be female, enrolled in 2003, recently immobilized, and to have a history of venous thromboembolism and varicose veins (Table 2). They were also more likely to use a high-risk dose of low-molecular-weight heparin and physical therapy. The intraclass correlation coefficient for the use of GCS was 0.35 (95% CI, 0.24–0.48), reflecting variations of practice between departments.

Prevalence of Deep Vein Thrombosis for GCS Users and Nonusers

Patients underwent compression ultrasonography at a median of 27 days after admission. Proximal deep vein thrombosis was found in 21 (5.7%) GCS users and in 49 (5.2%) nonusers (unadjusted OR, 1.09%; 95% CI, 0.64–1.84), while any deep vein thrombosis was found in 60 (16.2%) GCS users and in 139 (14.8%) nonusers (unadjusted OR, 1.11; 95% CI, 0.80–1.54; Table 3). The odds of proximal, distal, and any deep vein thrombosis did not differ for GCS users and nonusers, after adjusting for covariates or strata of propensity score (Table 3). Using the propensity score, 65% (240/371) of the GCS users were matched to single nonusers, with no residual significant imbalances in baseline characteristics. No differences in the odds of deep vein thrombosis were found for propensity-matched GCS users and nonusers (Table 3).

Odds Ratio of Deep Vein Thrombosis for Different Subgroups of GCS Users

In multivariable analysis, the OR of deep vein thrombosis did not differ according to the length of GCS or the daily duration of wear (Table 4). The ORs of deep vein thrombosis associated

with GCS were comparable for patients with and without pharmacological prophylaxis.

DISCUSSION

We found no significant differences in the rate of deep vein thrombosis between GCS users and nonusers among nonsurgical elderly patients in this observational study that relied on multivariable and propensity score adjustment. Using the same statistical analysis strategy, we found that prophylaxis with low-molecular-weight heparin was associated with a significant reduction in proximal and any deep vein thrombosis in the same study population. These findings are of clinical importance, as GCS are widely used to prevent deep vein thrombosis in nonsurgical patients^{10,15} and are recommended for medical patients with contraindications to anticoagulant-based prophylaxis.⁶

There are several potential explanations for our negative findings. First, GCS users were likely to be at higher risk for venous thromboembolism than nonusers. To adjust for measured covariates, we performed both multivariable logistic regression and propensity score analysis and the results did not modify our conclusions. As shown previously,²⁰ the results obtained with the 2 methods of adjustment were consistent. Second, GCS may fail to prevent deep vein thrombosis in nonsurgical patients. Although the reasons are unclear, GCS might be less effective in nonsurgical than in surgical patients. Indeed, there are limited and inconclusive data on the efficacy of GCS for nonsurgical patients,^{8,9} whereas strong evidence supports the efficacy of this method of thromboprophylaxis for surgical patients.⁷ Third, GCS may not provide the same protection in daily practice as in clinical trials in which major efforts are made to optimize proper use.⁶ GCS must be the correct size, properly worn, checked regularly to ensure correct placement, and removed for only a short time each day.⁶ Hence, prophylaxis with GCS requires educating and training

Table 3. Prevalence and Odds Ratio of Deep Vein Thrombosis for Graduated Compression Stocking Users and Nonusers

	Deep Vein Thrombosis, n/N (%)		Odds Ratio (95% Confidence Interval)	P Value
	Graduated Compression Stocking Users	Graduated Compression Stocking Nonusers		
Proximal deep vein thrombosis				
Unadjusted	21/371 (5.7)	49/939 (5.2)	1.09 (0.64 to 1.84)	.75
Adjusted for covariates and department*	21/371 (5.7)	49/930 (5.3)	1.03 (0.54 to 1.96)	.92
Adjusted for strata of propensity score [†]	—	—	1.11 (0.59 to 2.10)	.74
1:1 propensity-matched group [‡]	13/240 (5.4)	14/240 (5.8)	0.92 (0.42 to 2.02)	.84
Distal deep vein thrombosis				
Unadjusted	39/371 (10.5)	90/939 (9.6)	1.11 (0.74 to 1.65)	.61
Adjusted for covariates and department*	39/371 (10.5)	90/930 (9.7)	0.99 (0.62 to 1.59)	.96
Adjusted for strata of propensity score [†]	—	—	1.09 (0.67 to 1.78)	.73
1:1 propensity-matched group [‡]	25/240 (10.4)	19/240 (7.9)	1.46 (0.72 to 2.96)	.29
Any deep vein thrombosis				
Unadjusted	60/371 (16.2)	139/939 (14.8)	1.11 (0.80 to 1.54)	.53
Adjusted for covariates and department*	60/371 (16.2)	139/930 (14.9)	0.99 (0.66 to 1.47)	.94
Adjusted for strata of propensity score [†]	—	—	1.11 (0.74 to 1.66)	.62
1:1 propensity-matched group [‡]	38/240 (15.8)	33/240 (13.7)	1.23 (0.70 to 2.15)	.48

*Odds ratios of deep vein thrombosis were estimated using 2-level logistic regression with the 2 levels defined by patient and postacute care department and were adjusted for sex, age, study year, transient and chronic risk factors for venous thromboembolism, contraindication to anticoagulant treatments, physical therapy, pharmacological prophylaxis, and therapy with aspirin or other antiplatelet agents. Nine patients (0.7%) were excluded from multivariable and propensity analysis because of missing data.

[†]The propensity score corresponds to the probability of using graduated compression stockings and ranges from 0.01 to 0.97. Patients in the first strata had the lowest likelihood of using graduated compression stockings and patients in the seventh strata had the highest likelihood of using graduated compression stockings.

[‡]Odds ratios of deep vein thrombosis for 1:1 propensity-matched patients were estimated using conditional logistic regression.

Table 4. Prevalence and Odds Ratio of Deep Vein Thrombosis for Different Subgroups of Graduated Compression Stocking Users

	No. of Patients	Proximal Deep Vein Thrombosis		Distal Deep Vein Thrombosis		Any Deep Vein Thrombosis	
		N (%)	Odds Ratio (95% CI)*	N (%)	Odds Ratio (95% CI)*	N (%)	Odds Ratio (95% CI)*
Graduated compression stockings length [†]							
No	939	49 (5.2)	1.00 —	90 (9.6)	1.00 —	139 (14.8)	1.00 —
Below-knee length	216	10 (4.6)	1.01 (0.45 to 2.25)	25 (11.6)	1.11 (0.67 to 1.85)	35 (16.2)	1.11 (0.67 to 1.85)
Thigh length	93	3 (3.2)	0.50 (0.14 to 1.85)	9 (9.7)	0.89 (0.39 to 1.99)	12 (12.9)	0.72 (0.35 to 1.50)
Daily duration of graduated compression stocking use							
No	939	49 (5.2)	1.00 —	90 (9.6)	1.00 —	139 (14.8)	1.00 —
Daytime only	330	19 (5.8)	1.07 (0.56 to 2.06)	35 (10.6)	1.05 (0.64 to 1.71)	54 (16.4)	1.04 (0.69 to 1.57)
Daytime and nighttime	41	2 (4.9)	0.91 (0.16 to 5.15)	4 (9.8)	0.77 (0.23 to 2.62)	6 (14.6)	0.76 (0.26 to 2.20)
Use of pharmacological prophylaxis [‡]							
No: GCS nonusers	526	29 (5.5)	1.00 —	52 (9.9)	1.00 —	81 (15.4)	1.00 —
No: GCS users	175	9 (5.1)	0.94 (0.40 to 2.18)	23 (13.1)	1.21 (0.65 to 2.22)	32 (18.3)	1.10 (0.65 to 1.87)
Yes: GCS nonusers	413	20 (4.8)	0.76 (0.40 to 1.43)	38 (9.2)	0.86 (0.53 to 1.40)	58 (14.0)	0.79 (0.52 to 1.20)
Yes: GCS users	193	12 (6.1)	0.88 (0.40 to 1.94)	16 (8.2)	0.74 (0.38 to 1.45)	28 (14.3)	0.78 (0.45 to 1.35)

*Odds ratios of deep vein thrombosis were estimated using 2-level logistic regression with the 2 levels defined by patient and postacute care department and were adjusted for sex, age, study year, transient and chronic risk factors for venous thromboembolism, contraindication to anticoagulant treatments, physical therapy, pharmacological prophylaxis, and therapy with aspirin or other antiplatelet agents. Nine patients (0.7%) were excluded from multivariable and propensity analysis because of missing data.

[†]Graduated compression stocking length was specified for 309 (83%) patients.

[‡]Pharmacological prophylaxis included prophylaxis with unfractionated or low-molecular-weight heparin, and vitamin K antagonist. GCS, graduated compression stockings.

the patient and is associated with an increased workload for the clinical staff, which may limit their effectiveness. Previous studies have reported a widespread failure to use GCS properly in routine practice, with a potential for inadequate prophylaxis.²¹

Adjusted ORs of deep vein thrombosis were not different for below-knee and thigh-length stocking users in our study. Below-knee stockings are easier to wear, more likely to be fitted correctly, more comfortable, safer, and less expensive than thigh-length stockings;^{4,21,22} they are also as effective as thigh-length stockings for surgical patients.^{5,7,22} Another finding of our study was the absence of a significant interaction between GCS and anticoagulant-based prophylaxis. This finding contrasts with observational evidence showing that wearing GCS used in combination with another method of prophylaxis is more effective than this method used alone in surgical patients.^{5,7}

Our study had several limitations. First, prophylaxis with GCS was not based on random assignment, and therefore the results may be confounded by other factors. Although this is unlikely to occur given the broad spectrum of characteristics collected in our study, we cannot exclude residual confounding by unmeasured factors.¹⁷ Second, it is possible that our study lacked statistical power to detect a small but true difference in the rate of deep vein thrombosis; in addition, the number of events was low in subgroup analyses. However, our analytical sample comprised 1,310 patients, 371 of whom wore GCS. This sample size was larger than that of published randomized controlled trials designed to test the efficacy of GCS for surgical and nonsurgical patients.^{5,7} Third, we could not document correct sizing and application of GCS in our study although we assessed stocking length, daily duration of wear, and overall duration of use by direct observation and chart review. Fourth, using venous compression ultrasonography as the screening test in preventive studies has been questioned because of its limited accuracy

in asymptomatic patients. As a result of recent improvements in compression ultrasonography accuracy,²³ an increasing number of clinical trials rely upon ultrasound outcome measures.²⁴ Proximal deep vein thrombosis diagnosed by compression ultrasonography is considered an appropriate endpoint by recent clinical guidelines addressing prevention of venous thromboembolism.⁶ Fifth, other mechanical methods than GCS are used for the prevention of deep vein thrombosis. They include uniform compression stockings and intermittent pneumatic compression devices. Our findings cannot extend to these methods and further study is needed to assess the efficacy of intermittent pneumatic compression devices in preventing deep vein thrombosis for nonsurgical patients.²⁵ Sixth, our study was conducted in the postacute care setting and we cannot exclude that our findings could be different in medical patients hospitalized in acute care departments.

In conclusion, we found no significant differences in the rate of deep vein thrombosis between GCS users and nonusers in this observational study. Well-designed randomized controlled trials are needed to determine whether properly used GCS are an effective method of deep vein thrombosis prophylaxis in nonsurgical patients.

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Supplementary Material

The following supplementary material is available for this article online at www.blackwell-synergy.com

Appendix. Investigators and institutions participating to the study are listed.