A prospective controlled study of the efficacy of short-term anticoagulation therapy in patients with deep vein thrombosis of the lower extremity

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Purpose: **The long-term risk for recurrent deep venous thrombosis (DVT) and the incidence of post-thrombotic syndrome (PTS) after long-term anticoagulation (LTA) therapy have been widely debated. In this study, we compare the results of short-term anticoagulation therapy versus conventional LTA therapy in patients with DVT of the lower extremity.**
Methods: **Baseline assessments of DVT symptoms and risk factors were recorded in 105 patients. Diagnosis was made using duplex ultrasound/venography. Patients were sequentially assigned to 1 of the following treatment protocols: (A) conventional LTA therapy, which included initial intravenous standard heparin followed by warfarin on days 3 to 5 and was continued for 3 months for patients without pulmonary embolism (PE); or (B) short-term therapy, which included the same heparin therapy followed by warfarin on days 2 to 3 and was continued for 6 weeks only. Clinical and duplex ultrasound follow-up was done at 6 weeks, 3 and 6 months, and every 6 months thereafter.**
Results: **Risk factors, location of DVT, and mean age of the 2 groups were comparable. Mean follow-up was 59 months. There were 4 immediate major complications in patients of group A (4 of 54 [7%]; 2 PEs and 2 significant bleeds) and 3 in patients of group B (3 of 51 [6%]; 1 PE and 2 bleeds). On long-term follow-up, 18 of 43 (42%) patients in group A and 20 of 44 (46%) patients in group B had PTS. Similarly, 10 of 43 (23%) patients in group A and 9 of 44 (20%) patients in group B had 1 or more recurrent thromboembolic events (not statistically significant). A significant difference was demonstrated only in patients with cancer; LTA was favored in reducing recurrent DVT and PTS. Two other patients in group A had late significant complications secondary to warfarin (hemorrhage in 1 and coumadin necrosis in the other), with no complications in group B. The mean number of days of hospitalization were fewer for patients in group B (5 versus 8 days), which is mainly due to earlier initiation of warfarin therapy for group B.**
Conclusion: **In this study of our local population, we observed that short-term anticoagulation therapy was as effective as LTA therapy and less costly for use in most patients. It may also carry less risk of long-term warfarin complications, such as bleeding or skin necrosis. (J Vasc Surg 1998;28:630-7.)**

Significant controversy exists in the medical community regarding the treatment of deep venous thrombosis (DVT). The long-term risk for recurrent DVT and the incidence of post-thrombotic sequelae after long-term anticoagulation therapy have been widely debated. Barritt and Jordan[1] first demonstrated the benefits of anticoagulation in patients with pulmonary embolism. It is generally accepted that patients with a diagnosis of acute DVT must receive systemic heparin followed by an oral anticoagulant; however, controversy exists regarding the duration of anticoagulation therapy. When considering the duration of anticoagulation therapy, the physician must balance the risk of recurrence versus the risk of hemorrhagic complications. Several studies have tried to stratify patients into groups that should receive short-term anticoagulation (3 to 8 weeks) versus long-term

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anticoagulation (3 to 12 months).[2-6] These studies used varying modalities not only for diagnosis but also for follow-up examinations. A diagnosis of DVT was made in these studies by duplex ultrasound, venography, or iodine-125-labeled fibrinogen scanning or solely clinical examination.

The real problem concerns follow-up examinations of these patients. Recurrent DVT is a difficult clinical diagnosis to ascertain due to the incidence of post-thrombotic syndrome in this population.[7] A decision must be made as to which diagnostic test will be used to follow these patients and whether the results of this test will alter the treatment course.

A study evaluating short- versus long-term anticoagulant therapy must involve close follow-up of patients with serial duplex ultrasound examinations. Duplex ultrasound will provide both anatomic and physiological data for analysis and has become the standard modality for venous imaging and DVT diagnosis.[8] This is the ideal method for diagnosis and follow-up examinations for patients with DVT, not only because of its noninvasive nature but also because of its ability to provide both anatomic and physiological information.

Clearly, not all patients require 3 to 6 months of anticoagulant therapy after the first episode of DVT. How can it be determined which patients, if any, experience a significant change in the venous anatomy or flow during this time that would justify the benefits of anticoagulation therapy? Does anticoagulation therapy alter the natural history of abnormalities seen on duplex ultrasonography? Do the benefits of long-term anticoagulation therapy outweigh the risks of adverse reactions? In this study, we compare the results of short-term versus conventional long-term anticoagulation therapy in patients with DVT of the lower extremity.

PATIENTS AND METHODS

This was a prospective controlled study of 105 patients who were hospitalized (January 1987 through December 1994) for symptomatic unilateral DVT of the lower extremity. These were consecutive in-patients who were clinically suspected of having DVT, and they were referred by their physicians to the vascular laboratory at Charleston Area Medical Center/Robert C. Byrd Health Sciences Center of West Virginia University (Charleston, WV). Patients with a past history of DVT or pulmonary embolism, isolated calf vein thrombosis, hypercoagulable states (including protein C, protein S, and antithrombin III deficiencies or lupus anticoagulation antibodies), and DVT during pregnancy were excluded from this study. Before anticoagulation was initiated, blood samples were obtained from young patients (younger than 50 years) and those with a family history of venous thrombosis for measurement for protein C, protein S, antithrombin III, and lupus anticoagulant antibodies. Factor V Leiden was not tested routinely during that period of our study.

Table I. Patients Enrolled and Analyzed in the Study

	Group A	*Group B*
Number of patients enrolled	54*	51*
Excluded from primary analyses for:	11	7
Lost to follow-up†	4	2
Early complications	4	3
Deaths	3	2
Included in primary analyses	43	44
Included in intention-to-treat analysis	54	51

*One patient was mistakenly assigned to group A instead of group B.
†No follow-up available after hospital discharge.

Baseline assessments of DVT symptoms, risk factors, and demographic data were recorded. Diagnosis was made using duplex ultrasound in all patients, and some patients also had ascending venography of the lower extremity. This included 24 patients who underwent both venous imaging and venography for correlation regarding an earlier study.[9] Later, 2 additional patients underwent both tests because the venous image was not conclusive.

Patients were sequentially assigned to 1 of the following hospital treatment protocols. Patients in group A received conventional long-term anticoagulation therapy, which included an initial course of full-dose intravenous standard heparin (maintaining the activated partial thromboplastin time at 1.5- to 2-fold of control), followed by warfarin on days 3 to 5 of treatment (with an INR of 2 to 3 or a prothrombin time of 1.5- to 2-fold of the control) and was continued for 3 months for patients without pulmonary embolism. Patients in group B received short-term therapy, which included the same heparin therapy followed by warfarin on day 2 or 3 of treatment and was continued for only 6 weeks.

The rationale behind initiation of warfarin on days 3 to 5 of treatment for group A patients was based on the assumption by many physicians in the past, including some of the internists who referred these patients, that therapeutic anticoagulation with heparin should be obtained before warfarin administration and continued for 3 to 5 days until low

Table II. Effect of Short-Term (Group B) versus Long-Term (Group A) Anticoagulation on the Incidence of Postphlebitic Syndrome

Risk factor	*PPS*	*No PPS*	*Total*	*With PPS*	*P*
Stasis					
Group A	2	2	4	50%	
Group B	2	3	5	40%	
Total	4	5	9	44%	Fisher's exact P = .64
Trauma					
Group A	3	4	7	43%	
Group B	3	5	8	38%	
Total	6	9	15	40%	Fisher's exact P = .62
Cancer					
Group A	3	7	10	30%	
Group B	7	1	8	88%	
Total	10	8	18	56%	Fisher's exact P = .02
Postoperative					
Group A	4	6	10	40%	
Group B	3	8	11	27%	
Total	7	14	21	33%	Fisher's exact P = .44
Medical					
Group A	3	3	6	50%	
Group B	3	4	7	43%	
Total	6	7	13	46%	Fisher's exact P = .62
Unknown					
Group A	3	3	6	50%	
Group B	2	3	5	40%	
Total	5	6	11	45%	Fisher's exact P = .61
All patients					*95% Confidence interval*
Group A	18	25	43	42%	27.1 to 56.6
Group B	20	24	44	45%	30.7 to 60.2
Total	38	49	87	44%	

PPS, Postphlebitic syndrome.
For all patients, Fisher's exact $P = .45$, $\chi^2 = 0.90$.

steady state levels of coagulation factors are achieved.[10,11] This is based on the fact that concentrations of protein C and S are also reduced by warfarin. Protein C half-life is only 4 to 6 hours; thus, levels are reduced early in warfarin therapy, creating the potential for a transient procoagulation state, especially in patients with preexisting protein C deficiencies. Recently, however, many researchers are recommending that warfarin therapy be administered almost on the same day as initiation of heparin therapy. Because of this, we thought that it was appropriate to start warfarin therapy in group B patients within 24 hours. All patients in group B had warfarin treatment initiated on the second day of hospitalization, except for the 3 patients who had early major complications.

When a stable INR within the target range had been achieved, the test was repeated weekly for the first 6 weeks for the short-term anticoagulation therapy group and then every 2 to 3 weeks for the remaining period in the long-term anticoagulation therapy group. Effective anticoagulation therapy in each patient was defined as an INR of more than 2 in at least 67% of the tests for that patient.[12] This was achieved in 35 of 43 (81%) in group A and 37 of 44 (84%) in group B patients (ie, similar in both groups).

All patients were followed by duplex ultrasound scan at 6 weeks, 3 and 6 months, and every 6 months thereafter. Patients were also examined for the presence of edema, brawny induration, skin pigmentation in the gaiter area of the lower leg, or ulceration. All patients were instructed to wear graduated compression stockings (Sigvaris or Jobst) for at least 2 years.

The data were analyzed, and comparisons between groups were made by means of Fisher's exact test, χ^2 test, and 95% confidence interval.

Duplex scanning. Duplex imaging studies were performed with an Ultramark 8 or 9 HDI color scanner (Advanced Technology Laboratory, Bothell, Wash) using a 5- or 7.5-MHz linear transducer, and pulsed Doppler signals were obtained using a 5-MHz probe. Veins examined were the iliac, common femoral, superficial femoral, popliteal, and proximal tibial calf veins. All tests were interpreted blindly, without the knowledge of the treatment protocol.

Table III. Effect of Short-Term (Group B) versus Long-Term (Group A) Anticoagulation on the Incidence of Recurrent DVT

Risk factor	*Recurrent DVT*	*No recurrent DVT*	*Total*	*Total with recurrent DVT*	*P*
Stasis					
Group A	1	3	4	25%	
Group B	1	4	5	20%	
Total	2	7	9	22%	Fisher's exact $P = .72$
Trauma					
Group A	1	6	7	14%	
Group B	0	8	8	0%	
Total	1	14	15	7%	Fisher's exact $P = .47$
Cancer					
Group A	2	8	10	20%	
Group B	6	2	8	75%	
Total	8	10	18	44%	Fisher's exact $P = .03$
Postoperative					
Group A	2	8	10	20%	
Group B	0	11	11	0%	
Total	2	19	21	10%	Fisher's exact $P = .21$
Medical					
Group A	2	4	6	33%	
Group B	1	6	7	14%	
Total	3	10	13	23%	Fisher's exact $P = .44$
Unknown					
Group A	2	4	6	33%	
Group B	1	4	5	20%	
Total	3	8	11	27%	Fisher's exact $P = .58$
All patients					*95% Confidence interval*
Group A	10	33	43	23%	10.63 to 35.88
Group B	9	35	44	20%	8.54 to 32.37
Total	19	68	87	22%	

For all patients, Fisher's exact $P = .48$, $\chi^2 = .95$.

Reflux assessment using a 5-MHz pulsed Doppler probe placed centerstream at a 60-degree angle to the direction of the flow also was done. Assessment of reflux in the proximal veins (common femoral and proximal superficial veins) was made by performing the Valsalva maneuver, and reflux assessment for the mid and distal superficial femoral veins and the proximal and distal popliteal veins was made with compression over proximal muscle groups. Reversed flow lasting longer than 2 seconds was required for the diagnosis of reflux.[7,13] Imaging of the anterior tibial veins and the peroneal veins was not routinely done, particularly in the first several years of this study.

Our venous duplex interpretation criteria for acute DVT were reported previously.[9] The following criteria were used to consider the resolution of the DVT process: a return of the phasic Doppler signal with respiration and augmentation maneuvers, disappearance of the intraluminal echoes, and the ability to fully compress the vein in the transverse position by gentle pressure of the transducer. The following criteria were also used to characterize chronic phlebitic changes or nonresolution of DVT during follow-up: abnormal thickening or increased echogenicity of the vein wall, abnormal valve motion with the presence of reflux, or an occluded vein.

Recurrence of the DVT process was diagnosed when the previously mentioned criteria for DVT reappeared in a vein segment that had previously been considered normal or resolved.

Therefore, the outcome of DVT according to duplex scanning follow-up was divided into complete resolution (normal), chronic phlebitic changes, or recurrence of DVT.

Definitions. The term "post-thrombotic syndrome," or changes, was used in the presence of chronic postphlebitic changes on the duplex ultrasound as described previously, with or without clinical signs of postphlebitic syndrome (ie, leg swelling, hyperpigmentation, and/or ulceration). Significant hemorrhage was defined as major when transfusion treatment was needed, when hemoglobin concentration fell by 2 g/dL, or when it was retroperitoneal or cerebral. All cases of pulmonary embolism were

Table IV. Intention-to-Treat Analysis of All Patients

	Number with complications	*Percent with complications*	*95% Confidence interval*
All complications*			
Group A	34/54	63%	50.1 to 75.8
Group B	34/51	68%	53.7 to 79.6
Postphlebitic syndrome			
Group A	20/54	37%	24.2 to 49.9
Group B	22/51	43%	29.5 to 56.7
DVT			
Group A	10/54	19%	8.2 to 28.9
Group B	9/51	18%	7.2 to 28.1

*Including postphlebitic syndrome, DVT, pulmonary emboli (n = 3) and significant bleeding (n = 4).

documented by ventilation-perfusion lung scans and pulmonary angiograms.

Ventilation-perfusion lung scans were done in all patients with clinical suspicion of pulmonary embolism: 4 in group A (3 of these at the initial hospitalization and 1 at late follow-up [25 months]). Two of the 4 had a high probability ventilation-perfusion lung scan, and both were confirmed by pulmonary angiography. The other patient had a low probability ventilation-perfusion lung scan with a negative pulmonary angiogram, and the last patient had a normal scan. Three patients in group B had ventilation-perfusion lung scans: 2 during hospitalization; 1 patient had a high probability scan that was confirmed by angiography, and 1 had a low probability scan with a negative angiogram. The third patient had a low probability scan and negative angiogram at late follow-up (18 months).

To simplify the analysis of the results, risk factors were stratified into the following: malignancy, trauma, postoperative DVT (excluding trauma), prolonged stasis (cerebrovascular accident or others), medical reasons (including patients with multiple-system failure, patients in medical intensive or cardiac care unit), and unknown (if there were no identifiable risk factors).

RESULTS

All patients who met the study entry criteria were enrolled sequentially into either treatment group A (standard anticoagulation regimen; 54 patients) or group B (shortened regimen; 51 patients), except for 1 patient who was mistakenly assigned to standard therapy (group A) instead of group B. Eleven patients in group A and 7 patients in group B were excluded from the primary analyses (Table I). All 105 patients were examined in a secondary intention-to-treat analysis, based on the data available through their last follow-up.

There were 4 immediate major complications in group A (4 of 54 [7%], 2 with pulmonary embolism and 2 with significant bleeding with an INR of 3.2 in 1 and 6 in the other) and 3 in group B (3 of 51 [6%], 1 with pulmonary embolism and 2 with bleeding with an INR of 2.5 in 1 and 5.6 in the other). All of these 7 patients had inferior vena cava filter insertion. There were 5 late deaths: 3 in group A (2 myocardial infarctions and 1 malignancy) and 2 in group B (secondary to myocardial infarction).

Risk factors, location of venous thrombosis, and the mean age (52 years in group A and 54 years in group B) of the groups were comparable. Follow-up ranged from 26 to 95 months, with a mean of 59 months. In long-term follow-up, 18 of 43 (42%) patients in group A and 20 of 44 (46%) patients in group B had post-thrombotic sequelae. Only 3 patients in group A and 4 patients in group B had venous reflux without clinical postphlebitic changes. An analysis of the data with or without this group was not statistically significant. The remaining 15 patients in group A included 4 stage I patients (mild to moderate lower limb edema and mild skin changes), 8 stage II patients (marked trophic changes with hyperpigmentation, subcutaneous fibrosis, eczematoid changes, and edema), and 3 stage III patients (venous ulceration). The 16 patients in group B included 5 patients with stage I, 7 patients with stage II, and 4 patients with stage III. Similarly, 10 of 43 (23%) patients in group A and 9 of 44 (20%) patients in group B had 1 or more documented recurrent venous thromboembolic events (not statistically significant; Tables II and III).

The locations of these recurrent thromboembolic events were similar in both groups. Nine of 10 in group A and all 9 events in group B were located in the femoropopliteal veins. One patient in group A was localized to below-the-knee popliteal veins and proximal tibial veins. No documented

cases of pulmonary embolism were noted during the follow-up period.

Two patients in group A had late significant complications secondary to warfarin (hemorrhage in 1 with an INR of 5.2 and coumadin necrosis in the other), but none occurred in group B.

As noted in Tables II and III, when patients were classified according to risk factors, there were no statistically significant differences between groups A and B in the incidence of recurrent DVT or postphlebitic syndrome in patients with stasis, trauma, or postoperative DVT; in medical patients; or in patients with unknown causes for DVT. However, the incidence of recurrent DVT or postphlebitic syndrome was statistically significantly higher in patients with malignancy (75% for group B versus 20% for group A and 88% for group B versus 30% for group A, respectively).

An intention-to-treat analysis was performed to assess whether the excluded patients (as seen in Table I) had any impact on the conclusions drawn from the study. All early and late complications were included in the analysis, as were the last data available on the 5 patients excluded because of death (Table IV). The patient who was mistakenly assigned to group A instead of group B was evaluated according to the treatment he actually received (standard therapy). As with the primary analysis, there was substantial overlap of the 95% confidence intervals, suggesting minimal differences in the rates of complications.

The mean days of hospitalization were shorter for group B patients (5 days versus 8 days for group A), which is mainly due to the earlier initiation of warfarin therapy in group B.

DISCUSSION

This study has shown that the current treatment regimen for acute DVT should be questioned. The current practice has been to anticoagulate patients for a minimum of 3 months. This study has shown that this protocol may not be necessary in some patients and may also carry some increasing risk of warfarin complications.

The modest size of this study suggests that the power to detect a significance between the two treatment groups is limited. Power calculations estimate that a study of approximately 60 patients per treatment group would be needed to have a 50% likelihood of detecting a 25% worse rate of overall complications in the short-term anticoagulation group compared with the standard anticoagulation group (with an α value of $P = .05$). A study of similar size would have a 50% likelihood of detecting a 50% higher rate of postphlebitic syndrome in the short-term group compared to the standard therapy ($\alpha = .05$). However, the extremely small differences between the two treatment groups in rates of postphlebitic syndrome, DVT, and overall complications substantiates the conclusion that a clinically meaningful difference in risk of these complications is unlikely. Furthermore, unlike other larger studies,[2,14] this study has the advantage of evaluating patients in a single center, who were evaluated by a limited number of investigators. In addition, almost all patients (99 of 105 [94%]) had an objective evaluation for recurrent DVT and postphlebitic syndrome using venous duplex imaging. Thus, what the study lacks in power is balanced by the consistency in patient evaluation and data collection.

Duplex ultrasonography has provided a convenient and noninvasive means to serially examine patients with acute DVT and thus to accurately document the natural history of this condition.

The Research Committee of the British Thoracic Society[2] compared short-term (4 weeks) with long-term (3 month) therapy and found a higher recurrence rate with the short-term therapy (15% versus 8%). One of the problems with this study, however, was that the objective tests used to confirm suspected failures were done on only 38% of the patients in the 4-week group and 48% of those in the 3-month group. When only those with confirmed failures were compared, the difference was not statistically significant. These reported failure rates were significantly lower than the rates of other studies, which reported an approximate failure rate of 30%.[11,13,15] These rates were based on failure of clot resolution or clot propagation. The failure rate in our study was approximately 22% overall with an objective confirmation of all failures. We could not demonstrate a statistically significant difference in the failure rates between the 6-week and 3-month groups when all patients were combined, regardless of risk factors. It should be noted that we may have underestimated the incidence of recurrent DVT because we used duplex imaging to examine the proximal major veins (iliac, femoropopliteal) and the proximal tibial veins only. Duplex ultrasound scan has also decreased sensitivity in calf vein thrombosis in an asymptomatic surveillance protocol. However, the same principle was applied for both groups.

Levine et al[4] used impedance plethysmography in their study to determine whether patients should continue anticoagulation therapy after 4 weeks, but because of post-thrombotic syndrome, these results failed to differentiate between reflux and obstruction.[16-18] This study concluded that patients with

abnormal impedance plethysmography studies at 4 weeks should continue warfarin therapy for 3 months. Again, duplex ultrasonography can differentiate abnormalities secondary to occlusion versus reflux.

Schulman et al[14] compared patients who were randomized into 6 weeks versus 6 months of anticoagulation therapy. They found that recurrence rates were higher in the 6-week group (20%) than in the 6-month group (11%). There were 2 problems identified in this study; first, their exclusion criteria for enrollment was too strict, particularly the exclusion of patients with malignancy and prolonged immobility, and, second, they did not objectively examine all patients at follow-up. The patients who received objective study were only those patients with symptoms.

Complications secondary to warfarin therapy are another important consideration in these patients. In our study, 1 patient developed a significant bleeding complication and 1 developed skin necrosis. This does not include minor hemorrhages. This correlated to an approximate 4% complication rate, which was similar to that found in the Research Committee study (3%).[2]

The question remains as to whether patients can be stratified into those who will require long-term versus short-term therapy and as to what defines long-term and short-term therapy. The Research Committee of the British Thoracic Society[2] considered medical versus postoperative patients and concluded that the incidence of recurrence and nonresolution was significantly higher in the medical group of patients who were given short-term anticoagulation. We subclassified the patient population even further, breaking down the medical group into medical, stasis, and cancer, as stated earlier. We failed to demonstrate a statistically significant difference in the medical and stasis versus surgical groups with regard to recurrence of DVT and post-thrombotic syndrome in short- versus long-term anticoagulation. However, there was a difference in recurrence in the subcategory of cancer patients. A statistically significant difference was demonstrated favoring long-term anticoagulation for the development of post-thrombotic syndrome and for recurrence of DVT. However, the numbers in this subset of patients were too small for reliable conclusions. One interesting finding in the subclassification was that the trauma and postoperative groups had a similar low rate of DVT recurrence compared with the other groups; however, the incidence of post-thrombotic syndrome was similar.

Short-term therapy has principally been defined by the 4-week to 6-week interval because the majority of clot lysis and recanalization occurs in the first 1 to 3 weeks after acute DVT. This has been correlated to the increased activity of tissue plasminogen activator and the decreased activity of plasmin activator inhibitor-1.[19] This may explain why clot persistence or propagation occurs despite adequate anticoagulation.

Although it was not the intention of this study, treatment of DVT with low-molecular-weight heparins have been advocated in several studies in the past few years. Recently introduced low-molecular-weight heparin preparations can be administered subcutaneously, once or twice daily, without laboratory monitoring. Lensing et al[20] quantitatively assessed the relative efficacy and safety of low-molecular-weight heparin versus standard heparin for the initial treatment of DVT. Reports of randomized trials that were written in English between 1984 and 1994 were identified through a Medline search, and a complementary extensive manual search was conducted. They assessed the incidence of symptomatic recurrent venous thromboembolic disease, the incidence of clinically important bleeding, and mortality. Ten of 19 identified trials satisfied their predetermined criteria. The relative risk reductions for symptomatic thromboembolic complications (53% [95% confidence interval, 18% to 73%]), clinically important bleeding (68% [95% confidence interval, 31% to 85%]), and mortality (47% [95% confidence interval, 10% to 69%]) were all statistically significantly in favor of the use of low-molecular-weight heparin. The researchers concluded that low-molecular-weight heparins administered subcutaneously in fixed doses adjusted for body weight and without laboratory monitoring are more effective and safer than adjusted-dose standard heparin. They also believed that definitive randomized controlled trials for other low-molecular-weight heparins are required. Recently, Koopman et al[21] randomized assigned patients to receive adjusted-dose intravenous standard heparin administered in the hospital (198 patients) or fixed-dose subcutaneous low-molecular-weight heparin administered at home, when feasible (202 patients). They compared the treatments with respect to recurrent venous thromboembolism, major bleeding, quality of life, and costs. Seventeen of the 198 patients who received standard heparin (8.6%) and 14 of the 202 patients who received low-molecular-weight heparin (6.9%) had recurrent thromboembolism (difference, 1.7 percentage points; 95% confidence interval, –3.6 to 6.9). Major bleeding occurred in 4 patients assigned to standard heparin (2%) and 1 patient assigned to

low-molecular-weight heparin (0.5% difference, 1.5 percentage points; 95% confidence interval, –0.7 to 2.7). Quality of life improved in both groups. They also believed that physical activity and social functioning were better in the patients assigned to low-molecular-weight heparin. Among the patients in that group, 36% were never admitted to the hospital, and 40% were discharged early. This treatment was associated with a mean reduction in hospital days of 67%, ranging from 29% to 86% in the various study centers. They concluded that in patients with proximal vein thrombosis, treatment with low-molecular-weight heparin at home is feasible, effective, and safe.

Although the results of the use of low-molecular-weight heparin are promising, its implication in our study and similar studies is still uncertain. Therefore, a study comparing the efficacy of short-term versus long-term anticoagulation therapy using low-molecular-weight heparin is warranted.

In conclusion, our study demonstrates that outcomes of short- versus long-term treatment of acute DVT without pulmonary embolism are similar, except in cancer patients. It also shows that complications from long-term anticoagulation exist, and because benefit has not been demonstrated in many patients, short-term therapy for acute DVT should be considered in certain patients. The cost aspect should also be considered. Patients on short-term therapy will save not only money on drugs but also on laboratory testing. However, because the number of patients in this series is not large, the conclusions must be confirmed by other studies.

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