

Is thromboprophylaxis effective in reducing the pulmonary thromboembolism?

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Abstract

BACKGROUND: Deep vein thrombosis (DVT) is a relatively prevalent disease which causes high costs due to the required diagnostic tests, specialized treatments, and hospital admission. In recent decades, implementation of thromboprophylaxis protocols has significantly reduced the incidence of thromboembolism in hospitals. The present study aimed to compare the incidence of venous thromboembolism before and after implementation of the mentioned protocol in hospital with identified risk factors and underlying diseases.

METHODS: In this case-control group, 385 patients at the risk of DVT, some before and some after implementation of the protocol were studied. Therefore, the level of thromboprophylaxis and the incidence of venous thromboembolism were compared before and after the protocol. Data was entered into SPSS₁₅ and analyzed by chi-square and t tests.

RESULTS: Out of 385 patients, 34 patients (8.8%) had venous thromboembolism while 351 (91.2%) were not affected. The incidence of venous thromboembolism was significantly different before and after the implementation of the protocol (17.7% vs. 5.9%; $P < 0.001$). The incidence of venous thromboembolism in patients not receiving thromboprophylaxis was almost 5 times higher than those who received it (20.7% vs. 5.1%). The frequency distribution of thromboembolism had a significant difference in the two above mentioned groups ($P < 0.001$).

CONCLUSION: Thromboprophylaxis protocol reduced venous thromboembolism incidence in patients with underlying diseases which increase the risk of the complication.

Keywords: Deep vein thrombosis, Thromboprophylaxis.

ARYA Atherosclerosis Journal 2012, 8(1): 16-20

Date of submission: 5 Dec 2011, *Date of acceptance:* 12 Mar 2012

Introduction

Venous thromboembolism is one of the most common causes of emergency hospitalization. It is also a life-threatening complication in high risk patients admitted in internal and cardiac wards and patients undergoing surgery.¹ In most cases, deep vein thrombosis (DVT) either has no symptoms and or has nonspecific symptoms. Therefore, appropriate and timely usage of prophylactic anticoagulation is necessary to reduce the incidence of DVT and its related complications.² Pulmonary embolism is the third leading cause of cardiovascular diseases after acute coronary syndromes and brain stroke. It is also the first cause of mortality in admitted patients older than 65 years of age.³

Different figures in previous research indicate that the actual incidence of pulmonary embolism is 10 times greater than those determined based on clinical symptoms, autopsy studies, and diagnostic tests.³ Diagnostic tests for patients with suspected venous thromboembolism are highly expensive. On the other

hand, in cases confirmed through diagnostic tests, anticoagulation, which is potentially associated with risk of serious bleedings, would be required.⁴ Some studies have reported recurrent venous thromboses and their associated embolism to be caused by familial fibrinogen or plasminogen deficiency or reduced tissue plasminogen activator production.⁵

Examining another group of patients showed that fibrinolytic activity is low in materials extracted from venous samples.⁵ DVT is a relatively prevalent disease which causes high costs due to the required diagnostic tests, specialized treatments, and admission in hospital.⁶ In recent decades, implementation of thromboprophylaxis protocols has significantly reduced the incidence of thromboembolism in related hospitals. Therefore, the present study aimed to compare the incidence of venous thromboembolism before and after implementation of a thromboprophylaxis protocol in patients with identified risk factors and underlying diseases.

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Materials and Methods

This case-control study included 125 patients at risk of vein thrombosis and pulmonary thromboembolism admitted to Shariati Hospital (Isfahan, Iran) during 2008.

Convenient sampling method was used during which some patients with full and available records were evaluated. The inclusion criteria were a diagnosis of venous thromboembolism following congestive heart failure, severe respiratory disease, or limited physical activity, active cancer, acute neurologic illness, and previous venous thromboembolism, as well as having underlying risk factors of this complication such as obesity and old age. Patients classified as low-risk according to Wells criteria⁷ were excluded. After obtaining informed consents from all subjects, patients who were admitted to the hospital with a diagnosis of venous thromboembolism, had venous thromboembolism risk factors, and had received thromboprophylaxis according to the standard protocol were selected as the case group. The control group consisted of patients who had the abovementioned criteria but had *not* received thromboprophylaxis. The required data was collected and recorded in related forms. After editing and correcting, the collected data was analyzed in SPSS¹⁷ using chi-square and student-t statistical tests.

Results

In this study, 385 patients, including 228 (59.2%)

males and 157 (40.8%) females, at risk of DVT were studied. The mean age of patients was 48.3 ± 19.2 years and 23 subjects (6%) were under 20 years of age. The age group of 30-39 years and over 70 years possessed the highest frequency distribution. The prevalence of DVT and pulmonary thromboembolism risk factors are presented in table 1. According to this table, old age and immobility had the highest frequencies (59.2% and 26.5%, respectively) among the studied patients. As indicated in table 2, predisposition to pulmonary thromboembolism and DVT in older ages was more in individuals with sedentary jobs. In fact, while the risk of thromboembolism was 8.3% among patients with more active jobs, it was 15% and 14.2% in patients with sedentary and semi-sedentary jobs, respectively. The correlation between the type of job and predisposition to pulmonary thromboembolism and DVT was significant ($P = 0.009$).

The obtained results showed that 293 patients (76.1%) received thromboprophylaxis while 92 (23.9%) did not. On the other hand, before implementation of thromboprophylaxis protocol, thromboembolism was detected in 60.4% of the high-risk patients while 81.3% of the cases were prevented after the protocol. Therefore, prescription of thromboprophylaxis had a fully significant difference before and after the implementation of the standard thromboprophylaxis protocol ($P < 0.001$).

Table 1. Frequency distribution of the risk factors for deep vein thrombosis (DVT) and pulmonary thromboembolism in the studied patients

Risk factors	Frequency
Old age	228 (59.2%)
Previous history of DVT and pulmonary thromboembolism	48 (12.5%)
Family history	5 (1.3%)
Blood problems	12 (3.1%)
Immobility	102 (26.5%)
Smoking	99 (25.7%)
Surgery	46 (11.9%)
Obesity	7 (1.8%)
Pregnancy	8 (2.1%)
Delivery	9 (2.3%)
Cancer	20 (5.2%)
Medications	38 (9.9%)
Hormone replacement therapy	3 (0.8%)

Values are expressed as number (%).

Table 2. Frequency distribution of level of mobility and risk of deep vein thrombosis (DVT) and pulmonary thromboembolism ($P = 0.009$)

	High mobility	Sedentary	Moderate mobility	Total
Low risk	24 (15.3%)	3 (3.8%)	9 (6.1%)	36 (9.4%)
Moderate risk	120 (76.4%)	65 (81.3%)	118 (79.7%)	303 (78.7%)
High risk	13 (8.3%)	12 (15%)	21 (14.2%)	46 (11.9%)
Total	157 (100%)	80 (100%)	148 (100%)	385 (100%)

Values are expressed as number (%).

Before the implementation of thromboprophylaxis protocol, 96 patients were examined among whom 1 had a low risk, 73 had medium risk and 22 had high risk. Thromboprophylaxis had been prescribed for 40 patients (54.8%) with medium risk and 18 patients (81.8%) with high risk before the implementation of the protocol. Among the 289 patients who were examined after the implementation of the protocol, 35 had low risk, 230 had medium risk, and 24 had high risk. After the implementation of the protocol, thromboprophylaxis was prescribed for 11 patients with low risk, 200 patients with medium risk, and 24 patients with high risk. Figure 1 illustrates the frequency of thromboprophylaxis prescription before and after the implementation of the protocol according

to Wells criteria. The results showed that out of the 385 studied patients, 34 patients (8.8%) suffered from venous thromboembolism and 351 patients (91.2%) did not. The prevalence of venous thromboembolism before and after the implementation of the protocol was 17.7% and 5.9%, respectively. The incidence of this complication had a significant difference before and after the implementation of the protocol ($P < 0.001$) (Table 3). Thromboembolism occurred in 5.1% of patients who received prophylaxis and 20.7% of those who did not.

The results showed that 2 low risk patients (5.6%), 27 medium risk patients (8.9%), and 5 high risk patients (10.9%) suffered from venous thromboembolism (Table 4).

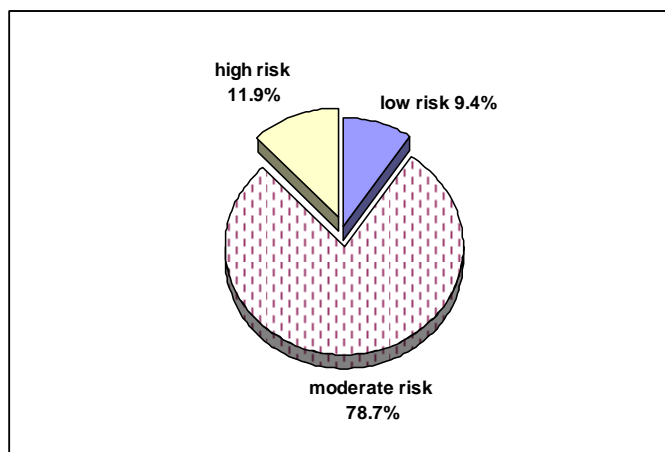


Figure 1. Frequency percentage of patients classified according to Wells criteria

Table 3. Frequency distribution of thromboprophylaxis and thromboembolism before and after the implementation of the protocol ($P < 0.001$)

		Before protocol	After protocol	Total
Thromboprophylaxis	Prescribed	58 (60.4%)	235 (81.3%)	293 (76.1%)
	Not prescribed	38 (39.6%)	54 (18.7%)	92 (23.9%)
	Total	96 (100%)	289 (100%)	385 (100%)
Thromboembolism	No	79 (82.3%)	272 (94.1%)	351 (91.2%)
	Yes	17 (17.7%)	17 (5.9%)	34 (8.8%)
	Total	96 (100%)	289 (100%)	385 (100%)

Values are expressed as number (%).

Table 4. Frequency distribution of the incidence of venous thromboembolism according to thromboprophylaxis ($P < 0.001$)

		Thromboprophylaxis		Total
		Yes	No	
Thromboembolism	Yes	278 (94.9%)	73 (79.3%)	351 (91.2%)
	No	15 (5.1%)	19 (20.7%)	34 (8.8%)
Total		293 (100%)	92 (100%)	385 (100%)

Values are expressed as number (%).

Discussion

The results of this study showed that implementation of thromboprophylaxis protocols can reduce the incidence of venous thromboembolism. The mean age of patients was almost 48 years which was within the age range of people prone to venous thromboembolism (over 40 years of age).⁸ In addition, consistent with previous studies which have shown DVT to be more common among men,^{9,10} approximately 60% of our patients were male.

On the other hand, although previous studies have reported DVT to be more prevalent among more sedentary jobs,⁹ the present study resulted in different findings. The job combination of our studied patients might have been affected by the type of patients who usually refer to Alzahra Hospital who are mostly of working and middle-class people. Other variables could have also affected job combination in our population.

Old age is one of the risk factors in patients with DVT.¹⁰ Some studies have indicated that if the pathophysiology of thromboembolism was fully understood, higher age could have also been an important factor in pulmonary thromboembolism.¹¹ In addition to age, immobility and smoking were the most prevalent factors and were observed in 25% of patients. Venous thromboembolism is of high importance among hospitalized patients, surgery candidates, individuals with a sedentary lifestyle, and patients who use several anticoagulant drugs. Considering necessary cautions and preventive protocols would thus lower the incidence of the disease and its complications.¹²

Many studies have suggested the effects of a previous history of thromboembolism as one of the risk factors. It is thus one of the complications which is given high attention almost in all medical centers.^{13,14}

In this study, almost half of the patients had more than one of the risk factors of venous thromboembolism. Therefore, determining the independent role of each factor is problematic and requires further comparative studies. However, the results indicated that there are many factors involved in the incidence of thromboembolism in Iranian society and there is usually more than one factor involved in this complication.

We also examined the incidence of venous thromboembolism before and after implementation of thromboprophylaxis. Out of 96 studied patients, 1 patient had low risk, 73 had medium risk, and 22 patients had high risk before the implementation of thromboprophylaxis. Out of 289 patients who were studied after the implementation of thromboprophylaxis, 35 patients had low risk, 230

had medium risk, and 24 had high risk. After implementation of the protocol, thromboprophylaxis had been prescribed for 11 patients with low risk, 200 patients with medium risk and 24 patients with high risk which indicates large attempt to reduce the incidence of venous thromboembolism after implementation of the protocol.

Conclusion

Our results showed that implementation of thromboprophylaxis protocol affected reduced venous thromboembolism. Therefore, conducting an analytical study is recommended to compare the incidence of venous thromboembolism and determine the effects of thrombolytic medications on the incidence of venous thromboembolism. The effects of common heparin thromboprophylaxis and low molecular weight heparin in the incidence of venous thromboembolism should be evaluated in hospitals throughout the province of Isfahan.

Conflict of Interests

Authors have no conflict of interests.

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How to cite this article: Rajabi F, Sadeghi M, Karbasian F, Torkan A. **Is thromboprophylaxis effective in reducing the pulmonary thromboembolism?**. *ARYA Atherosclerosis Journal* 2012; 8(1): 16-20.