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Original Article

Incidence of deep vein thrombosis and quality of venous thromboembolism prophylaxis

Incidência de trombose venosa profunda e qualidade da profilaxia para tromboembolismo venoso

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A B S T R A C T

Objective: to determine the incidence of deep vein thrombosis and prophylaxis quality in hospitalized patients undergoing vascular and orthopedic surgical procedures. **Methods**: we evaluated 296 patients, whose incidence of deep venous thrombosis was studied by vascular ultrasonography. Risk factors for venous thrombosis were stratified according the Caprini model. To assess the quality of prophylaxis we compared the adopted measures with the prophylaxis guidelines of the American College of Chest Physicians. **Results**: the overall incidence of deep venous thrombosis was 7.5%. As for the risk groups, 10.8% were considered low risk, 14.9%moderate risk, 24.3% high risk and 50.5% very high risk. Prophylaxis of deep venous thrombosis was correct in 57.7%. In groups of high and very high risk, adequate prophylaxis rates were 72.2% and 71.6%, respectively. Excessive use of chemoprophylaxis was seen in 68.7% and 61.4% in the low and moderate-risk groups, respectively. **Conclusion**: although most patients are deemed to be at high and very high risk for deep vein thrombosis, deficiency in the application of prophylaxis persists in medical practice.

Key words: Thromboembolism. Venous thrombosis. Venous thrombosis/prevention and control. Risk factors. Incidence.

INTRODUCTION

Deep vein thrombosis (DVT) is a major cause of hospital deaths in the world and, paradoxically, the most preventable[1]. In the United States in 2010 were estimated 900,000 annual cases of thromboembolism and one third of them died. Of the survivors, 4% developed pulmonary hypertension. It is estimated that 25-50% of patients with DVT will develop post-thrombotic syndrome, with impaired quality of life[2].

Although the guidelines for prophylaxis of venous thrombosis exist for over 15 years, they are as yet completely applied in less than 55% of indications[3]. Accordingly, one in every six cases of thromboembolism could be avoided[4].

Investigations on the actual situation of each institution would allow to reveal the true incidence of deep venous thrombosis, the profiles of hospitalized patients and the identification of groups at high and very high risk in order to take measures for the correct prophylaxis and therapy against this serious condition according to the best scientific evidence.

The objectives of this study were to determine the incidence of deep venous thrombosis of the lower limbs and quality of drug prophylaxis against venous thromboembolism.

METHODS

The study was conducted at the Risoleta Tolentino Neves University Hospital, Federal University of Minas Gerais, Belo Horizonte, Minas Gerais State, Brazil. The project received approval from the Research Ethics Committee, under protocol number 231/05 (SISNEP: CAAE 0231.0.203.000-05), in accordance with local regulations and signing of an informed consent form.

A sample of 296 patients would be required for the two goals. Data were collected between March 2011 and July 2012.

Inclusion criteria were: hospitalization in the clinics of Vascular Surgery and Orthopedics; age over 18 years; undergoing surgical procedures; agreement to participate; and agreement to sign the informed consent form.

Exclusion criteria were: pregnancy or puerperium; use of oral anticoagulants in therapeutic doses for more than 48 hours; atered prothrombin time (international

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normalized ratio above 1.5), not having been submitted to ultrasonography; extensive wounds in lower limbs that prevented vascular ultrasound; use of cast or splint in the lower limbs; clinical features of pulmonary thromboembolism; previous history of deep venous thrombosis or pulmonary thromboembolism; and contraindication to pharmacological prophylaxis, such as intracranial hemorrhage, gastroduodenal ulcer activity and blood dyscrasias.

Descriptive analysis was shown in contingency tables with demographic data, admission diagnosis, distribution of risk factors for DVT, type of surgical procedures, type of drug prophylaxis and result of vascular ultrasonography.

Data from medical records, evolutions and prescriptions were computerized.

Prophylaxis against deep vein thrombosis

The prophylaxis protocol considered appropriate in the present study was the guidelines of the American College of Chest Physicians, seventh and eighth editions[5,6].

Patients considered at low risk need not routinely drug prophylaxis. For moderate risk, the guidelines suggest the use of unfractionated heparin, 5000 IU b.i.d., or low molecular weight heparin, up to 3400 UI q.d. Those considered of high and very high risk should receive unfractionated heparin, 5000 IU t.i.d, or low molecular weight heparin, over 3400 UI q.d.

Statistical Analysis

The t test was used to assess equality of means according to each objective to be studied. Logistic regression was used to analyze the incidence of venous thrombosis according to admission diagnoses and to made it possible to evaluate the association between DVT and risk factors. We used the chi square test to assess the difference in the occurrence of DVT between the groups of Vascular Surgery and Orthopedics, the association between venous thrombosis and demographics and the influence of drug prophylaxis on the incidence of DVT.

RESULTS

The total sample comprised 335 patients. Of then, 94 patients were from Orthopaedics, and 241, from Vascular Surgery. We excluded 39 patients, all belonging to the group of Vascular Surgery, 202 remaining in the latter,resulting in a total of 296 analyzed patients.

Regarding the distribution of sex, 98 (33.3%) were women and 198 (66.6%) men. The mean age was 57.7 years and the mean body mass index was 24.6 kg/m^2. The admission diagnoses are shown in table 1.

Regarding risk stratification for DVT, 220 patients were considered of high and very high risk for deep venous thrombosis (Table 2). The overall incidence of DVT was 7.5% (22 patients). Among the Orthopaedics' patients, the incidence was 5.3% (five patients) and among the Vascular Surgery ones, 8.5% (17 patients).

The chi-square test did not demonstrate significant differences in the incidence DVT between the two clinics ($p = 0.34$).

The distribution of prophylactic medication is shown in Table 3. Tables 4, 5 and 6 present the evaluation of prophylaxis according risk groups in Global, Vascular Surgery and Orthopedics groups, respectively. In the global context, prophylaxis was considered adequate in 171 patients (57.7%). The rates of adequate prophylaxis in the groups Vascular Surgery and Orthopedics were 107 (52.9%) and 64 (68.0%), respectively.

Table 1 – Admission diagnosis of groups in Vascular Surgery and Orthopedics.

Diagnosis	N	%
Lower Limb Trauma	101	34.2
Peripheral Arterial Disease - Critical Ischemia	80	26.7
Diabetic Foot Infection	60	20.3
Acute Arterial Ischemia	14	4.7
Other (Arthrosis and Arthritis of Knee, Soft Tissue Infections of the Lower Limbs)	14	4.7
Diabetic Foot Sepsis	13	4.4
Aortic Disease	6	2.0
Peripheral Aneurysm	4	1.3
Diabetic Foot and ABI <0.9	1	0.3
Peripheral Arterial Disease – Asymptomatic / Claudication	1	0.3
Cerebrovascular Disease (Stroke / TIA)	2	0.6
Total	296	100

ABI: ankle-brachial index;; TIA: transient ischemic attack

Table 2 - Distribution of patients according to risk factors.

Groups of risk factors	Vascular Surgery	Orthopedics	Global
Low	17 (8.4%)	15 (16.0%)	32 (10.8%)
Moderate	35 (27.3%)	9 (9.6%)	44 (14.9%)
High	60 (29.7%)	12 (12.8%)	72 (24.3%)
Very high	90 (44.6%)	58 (61.7%)	148 (50%)
Total	202	94	296

Table 3 - Drug Prophylaxis.

Drug Prophylaxis	Vascular Surgery	Orthopedics	Geral
Enoxaparin 40mg/day	130 (64.4%)	68 (72.3%)	198 (68.9%)
None	50 (25.1%)	22 (23.4%)	72 (24.3%)
Enoxaparin 20mg/day	13 (6.0%)	2 (2.1%)	15 (5.0%)
Enoxaparin 60mg/day	8 (4%)	1 (1.1%)	9 (3.0%)

Table 4 - Quality of prophylaxis according to groups of risk factors: Vascular Surgery and Orthopedics groups.

Groups of risk factors	Inadequate lower dose N(%)	Inadequate higher dose N (%)	Adequate N(%)	Total N
Low	0 (0%)	22 (68.7%)	10 (31.3%)	32
Moderate	14 (31.8%)	27 (61.4%)	3 (6.8%)	44
High	20 (27.8%)	0 (0%)	52 (72.2%)	72
Very high	42 (28.4%)	0 (0%)	106 (71.6%)	148
Total	76	49	171	296

Table 5 - Quality of prophylaxis according to groups of risk factors: Vascular Surgery group.

Groups of risk factors	Inadequate lower dose N(%)	Inadequate higher dose N(%)	Adequate N(%)	Total N
Low	-	13 (76.5%)	4 (23.5%)	17
Moderate	8 (22.8%)	24 (68.5%)	3 (8.5%)	35
High	17 (28.2%)	-	43 (71.8%)	60
Very high	33 (36.7%)	-	57 (63.3%)	90
Total	58	37	107	202

Table 6 - Quality of prophylaxis according to groups of risk factors: Orthopedics group.

Groups of risk factors	Inadequate lower dose N(%)	Inadequate higher dose N(%)	Adequate N(%)	Total N
Baixo	-	9 (60,0%)	6 (40,0%)	15
Moderado	6 (66,6%)	3 (33,3%)	0 (0%)	9
Alto	3 (25,0%)	-	9 (75,0%)	12
Altíssimo	9 (15,4%)	-	49 (84,4%)	58
Total N	18	12	64	94

DISCUSSION

The true incidence of deep venous thrombosis in Vascular Surgery patients is little known and has variable rates, from 1.7 to 30%, being related to the diversity of surgical procedures, from minimally invasive ones to major surgeries[7-13].

As for Orthopaedics, the incidence rate and methods for prophylaxis of venous thrombosis are best known. The rates of DVT in the absence of prophylaxis are between 40 and 60%[5] and 2-5% in its presence[14].

In this study, the incidence of DVT was similar to the aforementioned studies. One must consider that performing vascular ultrasound in active search of asymptomatic patients could lead to a greater number of diagnoses of venous thrombosis. Perhaps, the quality of instituted prophylaxis in patients with high and very high risk, being superior to publications, may influence the results.

The types of vascular surgical procedures may influence the incidence of DVT. In the Vascular Surgery group, only 3% were submitted to procedures in the aorta. Moreover, 39% of the causes of hospitalization for critical ischemia were being largely treated by minimally invasive endovascular revascularization procedures.

Quality of prophylaxis

Prophylaxis against DVT depends on the presence of risk factors and types of surgical procedures. Adequate prophylaxis grants more protection to the patient and less risk of bleeding events from the use of anticoagulants as well as preventing deaths[15-17].

Despite the existence of several protocols for the assessment of risk factors and prevention of DVT in medical practice, rates of adherence to these protocols are from 16 to 55%[3,18-24].

The results of the present study were similar to the literature, and obtained significant proportion of hospitalized patients considered at high and very high risk, also showing the failure of the implementation of prophylaxis, as only 57.7% of patients received appropriate prophylaxis protocols.

Additionally, the study showed excessive use of pharmacological prophylaxis in patients at low to moderate risk, in agreement with the literature[18,24,25].

Moreover, in patients exposed to more venous thromboembolic events, the quality of prophylaxis was higher than in the cited studies. The most plausible explanation for this may be the overestimation of risk factors by physicians, considering them routinely and automatically with high and very high risk.

Our findings allow to infer that the overuse of chemoprophylaxis also led to the decline in the quality of drug prophylaxis. One should also stress that the overuse of chemoprophylaxis is associated with greater hospital costs.

Regarding the medications used as prophylaxis, these results indicate agreement with the guidelines[5,26,27]. Enoxaparin was the mainly used anticoagulant, prescribed to 75% of patients.

There was no association between chemoprophylaxis and incidence of thrombosis (p=0.199). Nionetheless, one must consider that only the use of prophylactic medication or not was evaluated.

From this, the institutions could develop surveillance committees of thromboembolic events that adopt effective strategies to improve the technical knowledge and adherence to adequate prophylaxis protocols in daily medical practice.

In conclusion, although the majority of patients is considered at high and very high risk for deep vein thrombosis in medical practice, there is still a deficiency in the application of prophylaxis.

R E S U M O

Objetivo: *determinar incidência de trombose venosa profunda e qualidade de profilaxia em pacientes internados submetidos a procedimentos cirúrgicos vasculares e ortopédicos.* ***Métodos:*** *avaliou-se 296 pacientes, cuja incidência de trombose venosa profunda foi estudada por meio de ultrassonografia vascular. Os fatores de risco para trombose venosa foram estratificados conforme modelo de Caprini. Para avaliação da qualidade de profilaxia comparou-se as medidas adotadas com as diretrizes de profilaxia do* American College of Chest Physicians. ***Resultados:*** *a incidência global de trombose venosa profunda foi 7,5%. Quanto aos grupos de riscos, 10,8% foram considerados de baixo risco, 14,9% moderado risco, 24,3% alto risco e 50,5% altíssimo risco. A profilaxia para trombose venosa profunda foi correta em 57,7%. Nos grupos de alto e altíssimo risco, as taxas de profilaxia adequada foram de 72,2% e 71,6%, respectivamente. O uso excessivo de profilaxia medicamentosa foi evidenciado em 68,7% e 61,4% nos grupos de baixo e moderado risco, respectivamente.* ***Conclusão:*** *Embora a maior parte dos pacientes seja considerada de alto e altíssimo risco para trombose venosa profunda, na prática médica persiste a deficiência na aplicação desta profilaxia.*

Descritores*: Tromboembolia. Trombose venosa. Trombose venosa/prenvenção e controle. Fatores de risco. Incidência.*

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