

Analysis of risk factors for deep vein thrombosis of the lower extremities

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Abstract

Deep vein thrombosis (DVT) is a common disease that occurs in most medical disciplines. It remains a frequent disease in which the major complication is pulmonary embolism (PE). Both DVT and PE occurring most frequently in nonsurgical (medical) patients. Defining the precise incidence of acute DVT is complicated due to the clinical nature of most smooth thrombosis in hospitalized patients, as well as non-specific clinical symptoms and signs. The incidence depends on the population studied, the intensity of screening and diagnostic tests are applied, which are made mainly in Vascular - Angiology Institutions that possess the technology and quality as the relevant context.

Keywords: Deep vein thrombosis, pulmonary embolism

1. Background

Deep vein thrombosis (DVT) is a common disease that occurs in most medical disciplines. It remains a frequent disease in which the major complication is pulmonary embolism (PE). Both DVT and PE occurring most frequently in nonsurgical (medical) patients. Defining the precise incidence of acute DVT is complicated due to the clinical nature of most smooth thrombosis in hospitalized patients, as well as non-specific clinical symptoms and signs. The incidence depends on the population studied, the intensity of screening and diagnostic tests are applied, which are made mainly in Vascular - Angiology Institutions that possess the technology and quality as the relevant context. [1,9-11]. Autopsies have reported prevalence of 35-52 % of DVT. Many clinical studies on the incidence of acute DVT focused on specific groups of patients, such as postoperative patients, which confirm the fact that risk factors significantly affect the appearance of DVT. Epidemiological studies have identified risk factors such as blood group A, lupus erythematosus, varicose veins, heart disease, but failed to fully demonstrate the correlation between them [4,5,10]. Modern studies of symptomatic documented DVT by venography reported a yearly incidence of 160 new cases per 100 thousand inhabitants, while EP is fatal in 0.06 % of the population. If compare the incidence of EP and

DVT in children, it is reported to be 0.07 to 10.000 children, and 5.3 in 10.000 children for hospitalized children [1,3,7,8]. Late consequences of terminal DVT (ulcus venosus, post thrombotic syndrome) appearing in 0.2 % of the European population [12]. Higher incidence of thrombosis among women, reported in earlier studies, is disputed by many modern studies which have reported a lack of significant differences between genders or something higher incidence among males [1,4]. Frequency of DVT in hospitalized patients according to the American College of Thoracic Physicians, 2004, is presented as follows [12].

- Internal disease patients 10-20%
- Surgical intervention 15-40%
- Great gynecological surgery 15-40%
- Major urologic surgery 15-40%
- Neurosurgical Interventions 15-40%
- Cerebrovascular insult 20-50%
- Major orthopedic surgery 40-60%
- Trauma 40-80%
- Spinal cord injury 60-80%
- Intensive Care Patients 10-80%
- Peripheral vascular surgery 29-43%

Prevention of DVT is considered a patient-safety measure in most mandated quality initiatives. The measures for prevention of DVT include mechanical methods (graduated compression

stockings and intermittent pneumatic compression devices) and pharmacologic agents. A combination of mechanical and pharmacologic methods produces the best results.

1.1 Aims of the study

To analyze the incidence of lower limb DVT cases in the general population compared with vascular patients enrolled in the Department of Vascular Surgery, University Clinical Center of Kosova, in the period September 2002-September 2004.

To analyze patients based on demographic characteristics such as gender, age, predisposing factors or risk factors for the development of lower limb DVT, days of hospitalization, diagnostic methods.

To sensitize health personnel about the importance of prevention of DVT at patients who are immobile for longtime, obese people, pregnant women with varicose veins, multiple births, the more lasting surgical and orthopedic interventions, etc.

2. Material

We retrospectively analyzed the medical documentation of patients with lower limb deep vein thrombosis hospitalized in the Department of

Vascular Surgery in University Clinical Center of Kosova, during the period September 2002-September 2004. The study involved patients hospitalized during the period specified, with diagnosis of lower limb deep vein thrombosis. We verified the history, clinical examination.

2.1 Methodology

Clinical data from medical documentation include: age, gender, history (symptoms of foot pain, edema, earlier data for deep vein thrombosis), risk factors, Color Duplex Scan of the deep venous system of the lower extremities, the applied therapy, duration of hospitalization. Results are presented in tables.

3. Results

In the two-year study period, September 2002-September 2004, in the Department of Vascular Surgery, University Clinical Center of Kosova were treated in total 1421 patients. Of them, due to venous disease were treated 431 patients, and because of the lower limb DVT, 194 patients. The largest number of patients has been due to the lower limb DVT (45.64%). (Table 1)

Table 1: Structure of patients hospitalized in the Department of Vascular Surgery, University Clinical Center of Kosova, due to venous disease in the period September 2002 - September 2004

Patology	No.	(%)
Varicose veins	172	39.91
Thrombophlebitis	40	9.28
Hemangioma	7	1.62
Deep vein thrombosis of lower limbs	194	45.01
Injuries	5	1.16
Deep vein thrombosis of upper limbs	13	3.02
Total	431	100.00

3.1 Gender and age structure of patients with lower limb DVT: Of the total number of patients with lower limb DVT (n = 194), 92 (47.42%) were male and 102 (52.57%) females (Table 2). Age of the patients behave in the range of 17 to 77 years. The average age was 49 years (Mean = 49.92, Std Dev =

18.83). The average age of male patients was slightly higher compared with female patients, but no significant difference (50.25 ± 18.64 vs. 49.65 ± 18.74 , T-test (M Vs. F) = 1.68, df = 192, $p > 0.095$) (Table 2).

Table 2: Structure of patients with lower limb DVT by gender and age group (n = 194)

Gender (*)	No.	(%)				
Men	92	47.42				
Female	102	52.58				
Age-group (years)	Men		Female		Total	
	No.	(%)	No.	(%)	No.	(%)
11 – 20	1	0.52	2	1.03	3	1.55
21 – 30	7	3.61	21	10.82	28	14.43
31 – 40	9	4.64	22	11.34	31	15.98
41+	75	38.66	57	29.38	132	68.04
Mean age (**)	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
	50.25	18.64	49.65	18.74	49.92	18.83

(*) ChiTesti = 0.52, $p > 0.47$; (**) T-testi (M vs. F) = 1.68, df = 192, $p > 0.095$

There is no distinction between statistically significant number of male and female patients with lower limb DVT (ChiTesti = 0.52, $p > 0.47$).

3.2 Structure of the patients according to the extremity involved: Of the total number of patients with DVT of the lower extremities (n = 194), 85 of them in the right limb and 119 in left limb (Table 3).

Table 3: Structure of patients with lower limb DVT based on gender and involved limb

Lower limb	Men		Female		Total	
	No.	(%)	No.	(%)	No.	(%)
Left	52	61.18	67	56.30	119	58.33
Right	33	38.82	52	43.70	85	41.67
Total	85	100.00	119	100.00	204	100.00

3.3 Recurrent deep vein thrombosis: Recurrent thromboses have a total of 22 patients. From them, 10 of patients in the study period and 12 previous relapse of thrombosis. Of the 10 patients, relapse in the same limb have had 7 patients, whereas in the opposite limb

3 patients. Of 12 patients, 6 patients had relapse in the same limb and 6 patients in the opposite limb.

3.4 The clinical presentation of patients with lower limb DVT: On physical examination the majority of patients have had limb edema, more than 3cm measured 10cm under tuberositas tibiae (Table 4).

Table 4: Structure of patients with lower limb DVT by clinical presentation (n = 194)

Clinical presentation	No	(%)
Homans sign positive	163	84.02
Edema more than 3cm, 10cm under tuberositas tibiae	174	91.24
Leg pain	102	52.58

3.5 Duration of hospitalization: The largest number of patients is the group who were hospitalized 10 days, which also coincides with the fact that the majority of patients is applied protocol, under which in the 7th day of heparine application is started therapy

with oral anticoagulants, according order, on the 7th day 2x1 tablet, on the 8th and 9th 2x1/2 tablet, and on the 10th day and the patient is doing thrombotest and continued therapy with oral anticoagulants (Table 5).

Table 5: Structure of patients with lower limb DVT based on days of hospitalization

Hospitalization (days)	No.	(%)
1-10	171	88.14
10-20	18	9.28
21+	5	2.58

3.6 Structure of patients with lower limb DVT by risk factors: Of the total number of patients with DVT of the lower extremities (n = 194) at 145 patients (74.74%), are known risk factors. The highest

percentages of cases that constitute risk factors are those who have previous surgical intervention (Table 6).

Table 6: Patients with lower limb DVT based on risk factors

Risk factors	No.	(%)
Varicophlebitis	4	2.06
Postpunction	2	1.03
Postpartum	13	6.70
Graviditas	10	5.15
Lumbago	10	5.15
Trauma	9	4.64
Surgery	25	12.89
Nephrolithiasis	7	3.61
Hypertrophy of the prostatae	8	4.12
Cholecystitis chr. calculosa	6	3.09
Diabetes mellitus	11	5.67
Systemic diseases	4	2.06
Hematologic diseases	1	0.52
Unoperated carcinomas	10	5.15
Hypertensio arterialis	7	3.61
Inflammatory bowel diseases	4	2.06
Insuff. VSM	2	1.03
Cysta ovarii	3	1.55
Cysta Beckeri	1	0.52
AAA	1	0.52
ICV	1	0.52
Hemiparesis	1	0.52
Radiation after hysterectomy	1	0.52
Post extirp. tu colli	1	0.52
Chemotherapy	1	0.52
Immobilization	2	1.03
Unknown risk factors	49	25.26
Total	194	100.00

3.7 Structure of patients with lower limb DVT and surgery as a risk factor: Of the total number of patients with DVT the lower extremities (n = 194), 25 patients (12.89%) had previous surgery. The largest

number of surgical patients is of lasting over 40 minutes, and patients who stay longer in bed after surgery (Table 7).

Table 7: Number of patients under surgery performed, duration of surgery and length of stay in bed

Type of surgery	Nr.	(%)	Duration of surgery (min.)	Length of stay in bed (days)
Hysterectomy	5	20.0	90	14
Cholecystectomy	4	16.0	60	10
Appendectomy	5	20.0	40	7
Prostathectomy	2	8.0	60	10
Varicose veins	1	4.0	90	2
Nephrectomy	2	8.0	90	8
Herniectomy	4	16.0	40	7
Mastectomy	2	8.0	90	10
Total	25	100.0		
Duration of surgery (min.)	No.	(%)		
40	9	36.0		
60	6	24.0		
90	10	40.0		
Length of stay in bed (days)	No.	(%)		
2	1	4.0		
7	9	36.0		
8	2	8.0		
10	8	32.0		
14	5	20.0		

3.8 Structure of patients with lower limb DVT and puerperium and pregnancy as risk factors: Of the total number of patients with lower limb DVT (n = 194) were 10 pregnant women (5.15%) and 13

women in the puerperium (6.70%). With advancing age increases the number of cases with DVT in pregnancy and puerperium (Table 8).

Table 8: Structure of pregnant and puerperium patients by age, pregnancy or birth order

Age	Pregnant women (n=10)		Puerperium (n=13)		Total (n=23)	
	No.	(%)	No.	(%)	No.	(%)
Under 35 y.	3	30.00	5	38.46	8	34.78
Over 35 y.	7	70.00	8	61.54	15	65.22
Pregnancy or birth						
First	2	20.00	2	15.38	4	17.39
Second	3	30.00	5	38.46	8	34.78
Third or more	5	50.00	6	46.15	11	47.83
Previous thrombosis						
Without thrombosis	7	70.00	8	61.54	15	65.22
With thrombosis	3	30.00	5	38.46	8	34.78

With advancing months of pregnancy is not observed significant difference in the number of cases

with DVT. DVT is more localized in the left lower limb (Table 9).

Table 9: Structure of patients based on pregnancy trimester and vein included with thrombosis

Pregnancy trimester		
First trimester		
Vein included in Doppler sonography		
VFS	No.	(%)
VFC, VIE	1	10.00
Lower limb included		
Right	1	10.00
Left	1	10.00
Second trimester		
Vein included in Doppler sonography		
VFC, VFS	No.	(%)
VIE	2	20.00
VP	1	10.00
Lower limb included		
Right	1	10.00
Left	3	30.00
Third trimester		
Vein included in Doppler sonography		
VP	No.	(%)
VP, VFS, VFC	1	10.00
Lower limb included		
Right	3	30.00
Left	1	10.00

3.9 Structure of patients with lower limb DVT and malignant disease as a risk factor: Of the total number of patients with lower limb DVT (n = 194), 10 patients (5.15%) have had malignant disease. The most frequent localization of tumors has been in

pelvis. The ratio between men and women shows no great difference. The average age of patients was 54.4 years, which corresponds with the fact that DVT is frequently with advancing ages, over 40 years (Table 10).

Table 10: Characteristics of patients with malignant disease and lower limb DVT (n = 10)

Age-group	No.	(%)
24-43	4	40.00
44-63	1	10.00
64-75	5	50.00
Median age (*)	Mean	StdDev
Men	57.25	22.31
Women	52.50	18.33
Total	54.40	18.93
Gender	No.	(%)
Men	4	40.00
Women	6	60.00
Tumor localization	No.	(%)
prostate	2	20.00
peritoneum	3	30.00
fossa iliaca	1	10.00
stomach	1	10.00
urinary bladder	1	10.00
uterus	1	10.00
groin	1	10.00
Vein included	No.	(%)
VFC sin.	6	60.00
VFS dex.	1	10.00
VIE sin.	1	10.00
VIE dex.	2	20.00

(*) (Mean M vs. F) T-tasti = 0.37, df = 8, p = 0.72

4. Discussion

Standard treatment for deep vein thrombosis aims to reduce immediate complications. In our patients oral anticoagulation therapy was prolonged when the treating physician suspected a high risk of recurrent events. In the states of the West are well known consequences of the high prevalence of the disease, diagnosis and therapy expenses, significant loss of working hours and the repercussions on the quality of life of patients with this disease [1,3,6]. In our paper cannot be determined lower limb DVT incidence in the general population, since the DVT of the crural region were treated and followed up on an outpatient basis, while on the ward were treated cases received from specialist clinics and emergency centers, excluding cases treated at the orthopedic clinic, gynecology, internal clinic, neurology etc. The average age of patients was 49 years, regardless of statistically significant difference between the male and the female, which is consistent with data from the literature. Most DVT is thought to be a result of propagation of thrombus from crural veins, but several authors have proved that iliofemoral DVT has its origins in the left iliac vein, in place by compression of the right iliac artery. This mechanism

can explain both the predominance of iliofemoral DVT on the left side and data that iliofemoral DVT often occurs in the absence of crural venous thrombosis [10,11,13,14]. In the research that we have done in our material, we have followed with interest the presence of risk factors in disease screening, diagnosis, treatment, complications and outcome as always stressing the importance of prophylactic measures. Many clinical studies have proven that DVT cannot be diagnosed based on the history and physical examination, even in high risk cases. Patients with lower limb DVT often complain for erythema, pain in extremity, local temperature, edema, slaughter [8,9,14].

So intimate clinical examination may need further evaluation but cannot as special, to be able to prove or rule out the diagnosis of DVT.

5. Conclusion

Prevention of lower limb DVT is considered a patient-safety measure in most mandated quality initiatives. The measures for prevention of DVT include mechanical methods (graduated compression stockings and intermittent pneumatic compression devices) and pharmacologic agents. A combination of

mechanical and pharmacologic methods produces the best results. Patients undergoing surgery should be stratified according to their risk of DVT based on patient risk factors, disease-related risk factors, and procedure-related risk factors.

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