

Deep venous thrombosis in elderly patients as a surgical emergency at King Abdulaziz University Hospital, Jeddah, Saudi Arabia

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Type of article: Original

Abstract

Background: Deep venous thrombosis (DVT) is a condition that occurs frequently among surgical, as well as acutely ill hospitalized medical patients, and is responsible for significant morbidity and mortality in hospitalized patients. Risk factors include older age, surgery and immobilization (as with bed rest, orthopedic casts, and sitting on long flights).

Objective: This study was conducted to identify the frequency and factors associated with occurrence of DVT among elderly patients referred to King Abdulaziz University (KAU) Hospital, Jeddah, Kingdom of Saudi Arabia.

Methods: The current study is a hospital based cross sectional study. The emergency, inpatients and outpatients' departments at KAU hospital were reviewed. We studied all the referred elderly subjects during the study period. All elderly patients (540) referred to or admitted to the hospital departments and who were clinically suspected to have DVT and subjected to Doppler examination were included in the study. Data were analyzed using descriptive statistics and Chi square test.

Results: Based on the results of Doppler examination, DVT was detected in 97 (18.0%) of the studied elderly population. There were no significant differences in gender between patients who developed DVT and those who were negative by Doppler examination ($p=0.018$). Other comorbidities as diabetes, IHD and hypertension were significantly associated with the occurrence of DVT among the participants ($p=0.05$, 0.05 and 0.04 respectively). Furthermore, the other investigated factors such as being bed ridden, cancer, orthopedic cast and previous DVT were not significantly associated with the development of DVT among the studied elderly patients ($p=0.42$, 0.16 , 0.45 and 0.75 respectively).

Conclusion: DVT has high prevalence in Jeddah; KSA. Thrombophilia screening should be regular for elderly patients with diabetes, hypertension and bed-ridden patients with recurrent DVT or patients with other risk factors. Knowing the most common risk factors and their significance in developing DVT is essential for early detection of DVT to prevent unwanted complications for elderly.

Keywords: Deep venous thrombosis, Elderly, Surgical emergency

1. Introduction

Deep venous thrombosis (DVT) is a major cause of morbidity and mortality among hospitalized patients worldwide and, simultaneously, the most preventable (1, 2). The National Institutes of Health Consensus Conference estimated

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Received: July 12, 2017, Accepted: September 16, 2017, Published: November 2017

iThenticate screening: September 16, 2017, English editing: October 14, 2017, Quality control: October 15, 2017

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that as many as 50,000 people die annually from pulmonary embolism in the USA, and 450,000 hospitalizations each year are associated with DVT (3). Several medical conditions increase the risk for DVT, including cancer, trauma, and antiphospholipid syndrome. Other risk factors include older age, surgery and immobilization (as with bed rest, orthopedic casts, and sitting on long flights) (4, 5). In a study conducted in France on elderly people over the age of 65, they reported six factors related to the development of DVT: restriction of mobility, bedridden for long period, aged 75 and older, history of DVT or pulmonary embolism, acute heart failure, chronic edema of the lower limbs and paresis or paralysis of a lower limb (6). A study to show the incidence of DVT and pulmonary embolism at King Abdulaziz University Hospital and to determine the risk factors, it was found that, a total of 75 patients were diagnosed to have DVT with mean age of 44.16 ± 14.5 years and male: female ratio of 1:2. Doppler ultrasound was used for the diagnosis in 56 of 75 patients (75%). Prolonged immobilization was found to be the most common risk factor in 17 of 75 (23%) (7). Over a 4-year period, 62 cases with strong evidence of venous thrombosis were studied at King Abdulaziz University and King Fahad Hospitals to learn the pattern of DVT in Jeddah, Western Saudi Arabia. There were 32 females and 30 males. The mean age of the group was 36.0 years (range 6-90 years). One or more risk factors was/were detected in 40 patients. Among these 14 factors, age more than 50 years, obesity, vasculitis, malignancy and postpartum were the common factors encountered. In the other 22 patients, no risk factor was found (1). This study was conducted to identify the frequency and factors associated with occurrence of DVT among elderly patients referred to King Abdulaziz University (KAU) Hospital, Jeddah, Kingdom of Saudi Arabia.

2. Material and Methods

2.1. Study design and participants

2.1.1. Design:

The current study is a hospital based cross sectional study conducted in KAU Hospital, Jeddah, Kingdom of Saudi Arabia (the emergency, inpatients and outpatients departments). The emergency, inpatients and outpatients departments in KAU hospital, were reviewed for a period of 6 months (from October 2016 to March, 2017).

2.1.2. Inclusion and exclusion criteria:

All elderly patients referred to or admitted to the hospital departments and who were clinically suspected to have DVT (paralysis, paresis or recent plaster immobilization of the lower extremities, localized tenderness along the distribution of the DVT, entire leg swollen, calf swelling at least 3 cm larger than asymptomatic side, calf pain, pitting edema confined to the symptomatic leg, erythema and warmth in the lower extremities or previously documented DVT) and subjected to Doppler examination were included in the study after obtaining an informed consent from them. Exclusion criteria were patients taking anticoagulant and who refused participation in the study.

2.2. Data Collection

A checklist was designed to obtain data about DVT frequency among elderly patients referred to KAU hospital, Jeddah, Kingdom of Saudi Arabia and factors associated with the development of DVT among them. Data was collected through face to face interviewing patients included in the study. The checklist included questions about age and sex of participants, department, site and result of Doppler examination, whether being bed ridden or using orthopedic casting and the history of previous DVT. In addition, the checklist included inquiries about presence of comorbidities such as diabetes, ischemic heart disease and cancer in the participating patients.

2.3. Ethical consideration

Before starting data collection, ethical approval was obtained from the Research Ethics Committee of the Faculty of Medicine, Northern Border University. During the data collection stage, informed consent was secured from each participant. The checklists used in data collection were anonymous, and confidentiality of data was assured.

2.4. The statistical analysis

Regarding the potential confounding factors, we studied a mostly homogenous population, of whom all were elderly, of both sexes, but different in the pathological background, which was studied in most of them but the numbers were different. The statistical analysis was carried out using SPSS version 16 (SPSS Inc., Chicago, Illinois, USA). Sample characteristics were summarized as numbers and percentages for categorical variables. Chi-Square test was used for comparing qualitative variables. A 5% level was chosen as a level of statistical significance in all statistical tests used in the study.

3. Results

According to the study, females constituted more than half (53.3%) of the studied patients (Table 1). Regarding age, (54.4%) of the participants were ≥ 60 years old. More than half (53.3%) of the studied patients were admitted to

inpatients departments of the hospital and more than one third (39.4%) of them were interviewed in the emergency department. Regarding the site of Doppler examination, 54% of the participants were subjected to examination of the right lower limb, (45.5%) were subjected to left examination, and bilateral examination was done only for (2.8%) of the studied patients. Also, based on the results of Doppler examination, DVT was detected in 18% of the examined patients and 82% of them were negative. Table 2 shows distribution of the studied elderly patients regarding suspected risk factors for DVT, presence of comorbidities, using orthopedic casting, and whether the patient was bed ridden or elderly. As illustrated by the presented data, (27.6%) of the cases had diabetes mellitus, (24.8%) had hypertension, (10.4%) were bed ridden, (5.7%) had ischemic heart disease and (4.8%) had cancer. Only (1.1%) of the studied patients reported a history of previous DVT. Table 3 illustrates the relationship between presence of DVT and suspected risk factors in the studied elderly cases. There were no significant differences in gender between patients who had developed DVT and those who were negative by Doppler examination ($p=0.018$). Other comorbidities as diabetes, IHD and hypertension were significantly associated with the occurrence of DVT among the participants ($p=0.05$, 0.05 and 0.04 respectively). Furthermore, the other investigated factors such as being bed ridden, cancer, orthopedic cast and previous DVT ($p=0.42$, 0.16 , 0.45 and 0.75 respectively) were not significantly associated with the development of DVT among the studied patients.

Table 1. Sex, age group, patient's department and site of Doppler examination of the studied elderly patients, KAU hospital, Jeddah, 2016 (n=540)

Variable		Frequency	%
Sex	Female	292	54.1
	Male	248	45.9
Age group (years); Mean \pm SD=54.78 \pm 19.8	60-	245	45.4
	70-	193	35.7
	80-	85	15.7
	90+	17	3.1
Patient's department	Emergency	213	39.4
	In patient	288	53.3
	Out patient	39	7.2
Site of Doppler examination	Bilateral	15	2.8
	Left	263	48.7
	Right	262	48.5
DVT diagnosed by Doppler examination	Negative	443	82.0
	Positive	97	18.0

Table 2. Distribution of the studied elderly patients regarding suspected risk factors, KAU hospital, Jeddah, 2016 (n=540)

Variable		Frequency	Percent
Diabetes Mellitus (DM)	Yes	149	27.6
	No	391	72.4
Being bed ridden	Yes	56	10.4
	No	484	89.6
Orthopedic casting	Yes	4	.7
	No	536	99.3
Hypertension	Yes	134	24.8
	No	406	75.2
Ischemic heart disease (IHD)	Yes	31	5.7
	No	509	94.3
Cancers (primary or metastasis)	Yes	26	4.8
	No	514	95.2
Previous DVT	Yes	6	1.1
	No	534	98.9
Other factors	Yes	25	4.6
	No	515	95.4

Table 3. The relationship between presences DVT and suspected risk factors in the studied elderly cases, KAU hospital, Jeddah, 2016 (n=540)

Risk factors	Deep venous thrombosis (DVT)		Total (n=540) n (%)	Chi-square	p-value
	Negative (n=443)	Positive (n=97)			
	n (%)	n (%)			
Gender (male)	8235 (53.0)	57 (58.8)	292 (54.1)	1.04	0.181
DM	129 (29.1)	20 (20.6)	149 (27.6)	2.87	0.05
Hypertension	117 (26.4)	17 (17.5)	134 (24.8)	3.36	0.04
Bed ridden	45 (10.2)	11 (11.3)	56 (10.4)	0.120	0.42
IHD	29 (6.5)	2 (2.1)	31 (5.7)	2.95	0.05
Cancers	19 (4.3)	7 (7.2)	26 (4.8)	1.48	0.16
Previous DVT	5 (1.1)	1 (1.0)	6 (1.1)	0.007	0.76
Orthopedic cast	3 (0.7)	1 (1.0)	4 (0.7)	0.134	0.54
Others	23 (5.2)	2 (2.1)	25 (4.6)	1.76	0.14

4. Discussion

DVT is a condition that occurs frequently among surgical as well as acutely ill hospitalized medical patients (8). DVT is responsible for significant morbidity and mortality in hospitalized patients, especially after surgery (9). The current study included 540 elderly - admitted, emergency or out patients of hospital departments who had agreed to participate in the study. They were clinically suspected to have DVT and subjected to Doppler examination during the study period and were interviewed to identify frequency and factors associated with occurrence of DVT among them. The study was carried out to identify the frequency and factors associated with occurrence of DVT among hypertensive patients referred to KAU Hospital, Jeddah, Kingdom of Saudi Arabia. The current study revealed that, based on the results of Doppler examination, 18 % of the examined patients had DVT and 82% of them were negative. Our results were far higher than a study which found prevalence of 28.28% (6). Another study reported that DVT was found in 7.8% out of 102 elderly patients (10). On the other hand, another study on elderly patients reported that the prevalence of asymptomatic DVT on admission and the incidence during hospital follow up were respectively 5.5% and 2.6 per 1,000 person-days, the prevalence and the incidence reached respectively 17.8% and 6.0 per 1,000 person-days among patients over 80 years (11). Also, a study in Indonesia (12) reported (42.86 %) as prevalence of DVT among elderly patients. According to the results of our study, no significant association was observed between gender and the development of DVT among elderly. In support of our findings, many studies (13-15) viewed gender was not significantly associated with DVT development. The studied comorbidities, diabetes, ischemic heart diseases and hypertension were significantly associated with the occurrence of DVT among the participants in the current study. This was not in accordance with the results reported by (14, 16-18), where these comorbidities had no significant effect on DVT development in the studied population. Furthermore, another study conducted by (19, 20) found that diabetes and ischemic heart diseases were not significantly associated with the occurrence of DVT. Also, another study reported that diabetes mellitus and hypertension were not participated as risk factors (21). The current study found no significant association between being bedridden and the development of DVT among the studied patients. In line with our findings, (10, 22) revealed that immobility was not significantly associated with DVT occurrence. In contrast, these findings were inconsistent with the results revealed by (23, 24) where being bedridden was among the independent risk factors of DVT. Little information is available on the relative risk of DVT associated with cancer in specifically elderly patients. Our study found no association between cancer and DVT development. Studies (25, 26) found that the overall risk of DVT in cancer patients increases 7-fold compared with individuals without cancer. Many other studies (9, 25, 27, 28) reported that cancer was found as a significant independent risk factor.

5. Conclusions

Based on the results of Doppler examination, DVT was detected in 18% of the examined elderly suspected patients. So, DVT has high prevalence in the hospitalized elderly in Jeddah, KSA. Thrombophilia screening should be regular for elderly patients with diabetes, hypertension and bed ridden patients with recurrent DVT or patients with other risk factors. Also, we recommend further research regarding causes and risk factors of DVT, with sufficient numbers of cases, especially in a diseased elderly population to put more effective preventive measures for that vulnerable group.

Acknowledgments:

The success and final outcome of this work required support and assistance of many people and we are fortunate to have got this throughout the completion of the work. We appreciate the support and cooperation of King Abdulaziz University Hospital, Jeddah, KSA. My thanks go also to Omar Tabaan Alenezi and Hala Mohammed Alanazi (Intern, Faculty of Medicine NBU) for their help in different steps of the research.

Conflict of Interest:

There is no conflict of interest to be declared.

Authors' contributions:

All authors contributed to this project and article equally. All authors read and approved the final manuscript.

References:

- 1) Okuhara A, Navarro TP, Procópio RJ, Bernardes RDC, Oliveira LDCC, Nishiyama MP. Incidence of deep vein thrombosis and quality of venous thromboembolism prophylaxis. *Revista do Colégio Brasileiro de Cirurgiões*. 2014; 41(1): 2-6. doi: 10.1590/S0100-69912014000100002.
- 2) Geerts WH, Bergqvist D, Pineo GF, Heit JA, Samama CM, Lassen MR, et al. Prevention of venous thromboembolism: American College of Chest Physicians evidence-based clinical practice guidelines. *Chest*. 2008; 133(6_suppl): 381S-453. doi: 10.1378/chest.08-0656. PMID: 18574271.
- 3) Cook D, McMullin J, Hodder R, Heule M, Pinilla J, Dodek P, et al. Prevention and diagnosis of venous thromboembolism in critically ill patients: a Canadian survey. *Crit Care*. 2001; 5(6): 336-42. doi: 10.1186/cc1066. PMID: 11737922, PMCID: PMC83855.
- 4) "What are the signs and symptoms of deep vein thrombosis?". National Heart, Lung, and Blood Institute. 2011.
- 5) Severinsen MT, Johnsen SP, Tjønneland A, Overvad K, Dethlefsen C, Kristensen SR. "Body height and sex-related differences in incidence of venous thromboembolism: A Danish follow-up study". *Eur J Intern Med*. 2010; 21(4): 268-72. doi: 10.1016/j.ejim.2010.03.013. PMID: 20603033.
- 6) Sajawal Ali M, Czarnecka-Kujawa K. Venous Thromboembolism in the Elderly. *Current Geriatrics Reports*. 2016; 5(2): 132.
- 7) Ahmed MM, Akbar DH, Al-Shaikh AR. Deep vein thrombosis at King Abdul Aziz University Hospital. *Saudi Med J*. 2000; 21(8): 762-4. PMID: 11423891.
- 8) Guyatt GH, Akl EA, Crowther M, Gutterman DD, Schünemann HJ, American College of Chest Physicians Antithrombotic Therapy and Prevention of Thrombosis Panel. Executive summary: Antithrombotic Therapy and Prevention of Thrombosis, 9th ed: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines. *Chest*. 2012; 141(2 Suppl): 7S-47. doi: 10.1378/chest.1412S3. PMID: 22315257, PMCID: PMC3278060.
- 9) Cogo A, Bernardi E, Prandoni P, Girolami B, Noventa F, Simioni P, et al. Acquired risk factors for deep-vein thrombosis in symptomatic outpatients. *Arch Intern Med*. 1994; 154: 164-8. doi: 10.1001/archinte.1994.00420020066008. PMID: 8285811.
- 10) Lawall H, Oberacker R, Zemmrich C, Bramlage P, Diehm C, Schellong SM. Prevalence of Deep Vein Thrombosis in Acutely Admitted Ambulatory Non-Surgical Intensive Care Unit Patients. *BMC Research Notes*. 2014; 7: 431. doi: 10.1186/1756-0500-7-431. PMID: 24996222, PMCID: PMC4105515.
- 11) Oger E, Bressollette L, Nonent M, Lacut K, Guias B, Couturaud F, et al. High prevalence of asymptomatic deep vein thrombosis on admission in a medical unit among elderly patients. *Thromb Haemost*. 2002; 88(4): 592-7.
- 12) Magetsari R, Dewo P, Nugroho AS, Lanodiyu Z. Deep Vein Thrombosis in Elderly Patients Following Surgery for Fracture of the Proximal Femur. *Malays Orthop J*. 2014; 8(3): 7-10. doi: 10.5704/MOJ.1411.002. PMID: 26401228, PMCID: PMC4536392.
- 13) Balogun IO, Roberts LN, Patel R, Pathansali R, Kalra L, Arya R. Clinical and laboratory predictors of deep vein thrombosis after acute stroke. *Thrombosis research*. 2016; 142: 33-9. doi: 10.1016/j.thromres.2016.04.002. PMID: 27115860.
- 14) Chua K, Kong KH, Chan SP. Prevalence and risk factors of asymptomatic lower extremity deep venous thrombosis in Asian neuro rehabilitation admissions in Singapore. *Archives of physical medicine and rehabilitation*. 2008; 89(12): 2316-23. doi: 10.1016/j.apmr.2008.05.025. PMID: 19061744.

- 15) Ota S, Yamada N, Tsuji A, Ishikura K, Nakamura M, Ito M. Incidence and clinical predictors of deep vein thrombosis in patients hospitalized with heart failure in Japan. *Circulation Journal*. 2009; 73(8): 1513-7. doi: 10.1253/circj.CJ-08-0990.
- 16) Matsuo H, Matsumura M, Nakajima Y, Ogawa T, Tazaki J, Doi T, et al. Frequency of deep vein thrombosis among hospitalized non-surgical Japanese patients with congestive heart failure. *Journal of cardiology*. 2014; 64(6): 430-4. doi: 10.1016/j.jjcc.2014.02.028. PMID: 24755201.
- 17) Lu DY, Huang CC, Huang PH, Chung CM, Lin SJ, Chen JW, et al. Metformin use in patients with type 2 diabetes mellitus is associated with reduced risk of deep vein thrombosis: a non-randomized, pair-matched cohort study. *BMC cardiovascular disorders*. 2014; 14(1): 187. doi: 10.1186/1471-2261-14-187. PMID: 25510597, PMCID: PMC4274716.
- 18) Yamada N, Hanzawa K, Ota S, Nakamura M, Sato K, Ikura M, et al. Occurrence of deep vein thrombosis among hospitalized non-surgical Japanese patients. *Annals of vascular diseases*. 2015; 8(3): 203-9. doi: 10.3400/avd.oa.14-00132. PMID: 26421068, PMCID: PMC4575331.
- 19) Wei J, Li W, Pei Y, Shen Y, Li J. Clinical analysis of preoperative risk factors for the incidence of deep venous thromboembolism in patients undergoing posterior lumbar interbody fusion. *Journal of orthopaedic surgery and research*. 2016; 11(1): 68. doi: 10.1186/s13018-016-0403-0.
- 20) Kang JH, Keller JJ, Lin YK, Lin HC. A population-based case-control study on the association between rheumatoid arthritis and deep vein thrombosis. *Journal of vascular surgery*. 2012; 56(6): 1642-8. doi: 10.1016/j.jvs.2012.05.087. PMID: 23085092.
- 21) Holst AG, Jensen G, Prescott E. Risk Factors for Venous Thromboembolism. *Circulation*. 2010; 121: 1896-903. doi: 10.1161/CIRCULATIONAHA.109.921460.
- 22) Fletcher H, Wharfe G, Williams N, Pedican M, Brooks A, Scott P, et al. Venous thromboembolism in Jamaican women: experience in a university hospital in Kingston. *West Indian Medical Journal*. 2009; 58(3): 243-9. PMID: 20043532.
- 23) Sun K, Wang C, Pang B, Yang Y, He W, Chen T, et al. Study on the risk factors of deep venous thrombosis in acute hospitalized stroke patients. *Zhonghua Liu Xing Bing Xue Za Zhi*. 2004; 25(12): 1019-23. PMID: 15769354.
- 24) Low FZ, Yeow RCH, Yap HK, Lim JH. Study on the use of soft ankle-foot exoskeleton for alternative mechanical prophylaxis of deep vein thrombosis. *Rehabilitation Robotics (ICORR)*. 2015; 11-4. doi: 10.1109/ICORR.2015.7281264.
- 25) Heit JA, Silverstein MD, Mohr DN, Petterson TM, O'Fallon WM, Melton LJ 3rd. Risk factors for deep vein thrombosis and pulmonary embolism: a population-based case-control study. *Arch Intern Med*. 2000; 160: 809-15. doi: 10.1001/archinte.160.6.809. PMID: 10737280.
- 26) Blom JW, Doggen CJ, Osanto S, Rosendaal FR. Malignancies, prothrombotic mutations, and the risk of venous thrombosis. *JAMA*. 2005; 293: 715-22. doi: 10.1001/jama.293.6.715. PMID: 15701913.
- 27) Hansson PO, Sorbo J, Eriksson H. Recurrent venous thromboembolism after deep vein thrombosis: Incidence and risk factors. *Arch Intern Med*. 2000; 160: 769-74. doi: 10.1001/archinte.160.6.769. PMID: 10737276.
- 28) Heit JA, Mohr DN, Silverstein MD, Petterson TM, O'Fallon WM, Melton LJ 3rd. Predictors of recurrence after deep vein thrombosis and pulmonary embolism: A population-based cohort study. *Arch Intern Med*. 2000; 160: 761-68. doi: 10.1001/archinte.160.6.761. PMID: 10737275.