

# Venous Thrombosis Diagnosis and Early Management in Family Medicine Practice

<sup>1</sup>Youssif Mohammed alnawar, <sup>2</sup>Nora yazid aldegthaither,  
<sup>3</sup>Abdulrahman Saleh Alshebel, <sup>4</sup>Mohammad Abdullah Aldossary, <sup>5</sup>Omar hatem taha,  
<sup>6</sup>Mohammad Ahmed AL-Ghamdi, <sup>7</sup>Moatasem Khalid murad, <sup>8</sup>Mariam khalid Al-Daie,  
<sup>9</sup>Asawir Mohammed Al Qurashi, <sup>10</sup>Lujain Ahmed Fallatah

---

**Abstract:** Vein thrombosis is the formation of blood clots (thrombi) in the veins. Our aim to discuss the pathogenesis, highlight the risk factors and outline the treatment. PubMed, Embase, and Google scholar databases were searched up to November, 2017 for published studies with English language and human subjects discussing the roles of family physicians in management of Vein thrombosis is the formation in primary care. DVT is a potentially life-threatening clinical condition that can lead to preventable morbidity and mortality. A diagnostic pathway includes pretest probability, D-dimer assay, and venous ultrasound work as a more reliable way of diagnosing DVT. Prevention consists of both mechanical and pharmacological modalities and is offered for both inpatients and outpatients who are at risk of this disease. Family physician should take into consideration current situation of patient and work on prevention the extension of thrombus, acute PE, recurrence of thrombosis, and the progression of late complication, like pulmonary hypertension and post-thrombotic syndrome.

**Keywords:** Vein thrombosis, pathogenesis, treatment.

---

## 1. INTRODUCTION

Venous thrombosis, consisting of deep vein thrombosis (DVT) and also pulmonary embolism (PE), accompanies an occurrence of about 1 each 1000 yearly in grown-up populaces [1]. Rates are somewhat greater in males compared to females. Regarding two-thirds of episodes show up as DVT and also one-third as PE with or without DVT. The significant results of venous thrombosis are fatality, reoccurrence, post-thrombotic syndrome and also significant blood loss as a result of anticoagulation. Thrombosis is likewise related to damaged lifestyle, specifically when post-thrombotic syndrome establishes [2]. Fatality happens within one month of an episode in concerning 6% of those with DVT as well as 10% of those with PE [3]. The death rate for PE has actually been approximated to be high as 30% in research studies that consisted of autopsy-based PE medical diagnosis [4], explaining that several PE are not acknowledged medically prior to fatality. Death rates are reduced amongst patients with idiopathic venous thrombosis and also highest possible amongst those whose thrombosis happens in the setup of cancer.

Venous thrombosis is an illness of aging, with a reduced rate of regarding 1 each 10,000 every year prior to the 4th decade of life, increasing quickly after age 45 years, as well as coming close to 5-6 each 1000 each year by age 80 [5]. In one research study the 8-year rate amongst those 85 as well as older at standard was 13-fold more than in those aged 45-55, with an outright rate of 7 each 1000 yearly [6]. The morbidity effect of thrombosis on the elders seems higher, with a steeper increase in occurrence of PE as compared with DVT with aging [5]. Hence, a greater situation casualty of thrombosis in older individuals is seen. It is most likely that thrombosis is much less detected in specific incapacitated senior patients so these price quotes are most likely underestimates. The factors for a raised thrombosis danger with age are not recognized, yet might connect to enhancing the visibility of various other diseases inclining to thrombosis, to rises in coagulation possibility, or some mix of these.

Vein thrombosis is the formation of blood clots (thrombi) in the veins. Our aim to discuss the pathogenesis, highlight the risk factors and outline the treatment.

## 2. METHODOLOGY

PubMed, Embase, and Google scholar databases were searched up to November, 2017 for published studies with English language and human subjects discussing the roles of family physicians in management of Vein thrombosis is the formation in primary care. Moreover, we included reviews and randomized control studies, we excluded all case reports, in our search strategy we scanned the references list of our included studies for more relevant articles.

## 3. DISCUSSION

### • Pathogenesis:

Thrombus development preferentially begins in the valve pockets of the capillaries of the calf and also expands proximally. This is particularly real for those that happen to comply with surgical treatment [7]. Though a lot of thrombi start intraoperatively, some begin a couple of days, weeks, or months after surgical treatment. Offering its support to the beginning of thrombus in shutoff pockets is a current theory of a raised expression of endothelial protein C receptor (EPCR) as well as thrombomodulin (TM) as well as a lowered expression of Von Willebrand variable (vWF) kept in mind in shutoff sinus endothelium compared to vein luminal endothelium. This indicates an upregulation of anticoagulants (EPCR, TM) and also a downregulation of procoagulant (vWF) buildings of the valvular sinus endothelium [8].

Thrombus is made up primarily of fibrin and also red cells (red or fixed thrombus). Venous thrombus has to be separated from postmortem embolisms at autopsy. Postmortem embolisms are gelatinous and also have a dark red reliant part (created by red cells that have actually resolved by gravity as well as a yellow chicken fat supernatant appearing like thawed and also thickened chicken fat). They are typically not connected to the underlying wall surface. This remains in comparison to the venous thrombi which are stronger. They usually have a factor of add-on to the wall surface and also transection discloses unclear strands of light grey fibrin [9].

DVT in the reduced arm or leg can be categorized as a) proximal, when the popliteal vein or upper leg capillaries are entailed or b) distal, when the calf bone blood vessels are included. Scientifically, proximal vein thrombosis is of better relevance as well as is related to severe chronic conditions such as energetic cancer, congestive cardiac failing, respiratory system insufficiency, or age over 75 years, whereas distal thrombosis is more frequently related to threat variables such as current surgical treatment as well as immobilization. Deadly PE is much more most likely to arise from proximal DVT [10]. Post-thrombotic syndrome, a chronic, possibly disabling problem identified by leg swelling, discomfort, venous ectasia, and also skin induration, is developed by 1 year after DVT in 17% to 50% of instances [11].

### • Risk Factor:

The majority of healthcare facility inpatients go to threat of deep vein thrombosis (DVT) as well as the linked problems of deadly or non-fatal lung embolism and also post-thrombotic syndrome. Acknowledged threat elements for DVT are normally associated with several aspects of Virchow's set of three (tension, vessel injury, and also hypercoagulability), and also consist of surgical treatment, injury, immobilisation, hatred, use oestrogens, heart or respiratory system failing, as well as cigarette smoking (table 1) [12]. Surveyance researches have actually discovered that the outright danger of DVT is 10%-20% amongst basic clinical patients as well as approximately 40%-80% in patients having hip surgical treatment, knee surgical treatment, or significant injury (table1).

**Table 1: Risk Factors for Venous Thrombosis [12]**

Older Age	Immobility (bedrest, neurologic, plaster cast)
Obesity/Overweight	Varicose Veins
Personal History of Previous Thrombosis	Pregnancy/Puerperium
Family Member with Venous Thrombosis	Postmenopausal Hormone Therapy
Surgery	Selective Estrogen Receptor Modulating Drugs
Hospitalization	Oral Contraceptives
Cancer	Long Travel
Myeloproliferative Disease	Genetic Factors Affecting Coagulation Balance
Trauma/Injury, especially of legs/spine	Antiphospholipid Syndrome

- **Modifiable Risk Factors:**

**Obesity:**

A vital flexible danger variable for thrombosis is obesity. Excessive weight is specified as a body-mass index (BMI) over 30 kg/M2. Weight problems brings about a 2 to 3-fold greater danger of venous thrombosis in males and females [13], [14]. The threat related to extreme obesity (BMI over 40 kg/M2) is also greater. In one research study, the relationship of weight problems to thrombosis threat was not moderated by distinctions in degrees of fibrinogen, factor VIII, factor IX and also D-dimer [13]. Additional job is should specify the system. It is feasible that physical elements of body dimension are essential, bring about damaged venous return, which biochemical criteria related to obesity, such as raised coagulation and also inflammation contribute.

The overweight have an additional rise in thrombosis danger when they are subjected to various other thrombosis threat elements, such as exogenous contraceptive or postmenopausal hormonal agents [15]. The organization of obesity with thrombosis is particularly essential since excessive weight is enhancing significantly worldwide.

**Homocysteine:**

Raised homocysteine has actually been regularly reported as a threat variable for venous thrombosis and also degrees can be lowered with B vitamin supplements [16]. Verification of the causal nature of this organization calls for randomized regulated tests of homocysteine decreasing. The only finished test amongst venous thrombosis patients did disappoint any kind of advantage in avoidance of recurring occasions making use of 5 mg folic acid, 50 mg pyridoxine, and also 0.4 mg cyanocobalamin, compared to placebo, carried out daily in 701 patients with previous idiopathic venous thrombosis [17].

- **Temporary Risk Factors:**

These problems raise the danger of thrombosis, normally for a variety of weeks complying with direct exposure. As defined above, when greater than one causing problem or threat aspect exists, the threat is generally greater. As an example, if a patient were hospitalized for pneumonia and had current leg injury, the danger of thrombosis would certainly be greater as a whole compared to in a patient without current injury [18].

**Hospitalization:**

A lot of hospitalized patients have threat elements for venous thrombosis, such as immobility, cancer, infection as well as surgical procedure. As much as 20% of patients confessed to a clinical solution will certainly have thrombosis and also approximately 40% confessed to a medical solution. A lot of these occasions are not scientifically noticeable, yet still might cause later troubles like lung embolism. Regarding 10% of all fatalities in medical facility relate to lung embolism, as well as lot of times it was not presumed prior to fatality [19]. Because of this it is essential that a lot of patients confessed obtain treatment versus venous thromboembolism [20].

**Surgery/Trauma:**

The threat of thrombosis with surgical treatment differs relying on the surgical procedure kind as well as patient qualities. Strangely enough, one research reported that older patients did not have a greater threat of post-operative venous thrombosis compared to more youthful patients for sure kinds of surgical treatment [21]. Preventive treatments versus thrombosis are utilized, with the strength of treatment connecting to the danger standing of the patient.

**Immobility:**

Immobility raises the threat of thrombosis, most likely as a result of stasis of blood flow in the venous system. Pertinent setups of immobility consist of bedrest, plaster casts on the legs and also paresis of the legs as a result of neurological problems. Research-based interpretations of stability because of bedrest vary, yet a period of 4 days appears practical. Small types of stability, such as after small surgical treatment or injury, have actually additionally been connected to thrombosis threat [22].

**Cancer:**

Tumor cells turn on coagulation, tumors could press blood vessels creating tension as well as cancer patients are revealed to a hospital stay, surgical procedure and also radiation treatment, which all boost their threat.

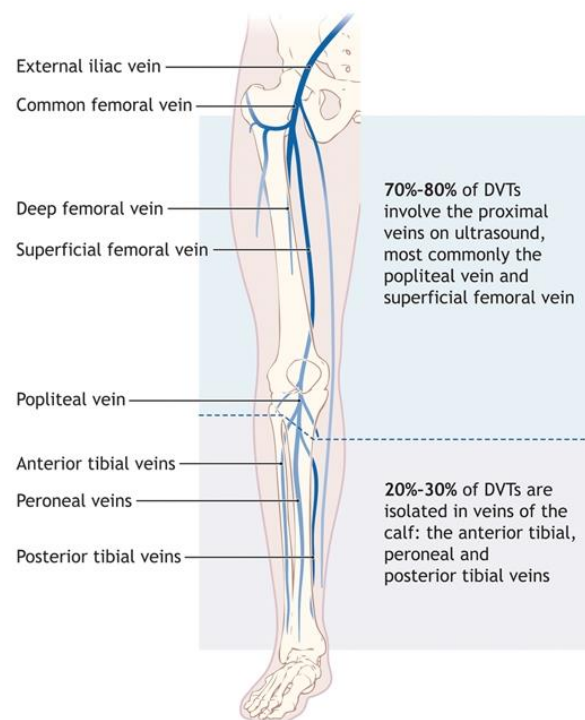
**Travel:**

Any kind of traveling has the possible to raise the threat of venous thromboembolism; period of traveling is a crucial variable. Travel by air, vehicle, train or bus for 4 or even more hrs all enhance the threat by regarding 2-fold for a number of weeks after traveling [23]. As previously, the danger is greater when various other thrombosis threat elements exist.

- **Imaging tests:**

Compression ultrasonography is currently the imaging examination of option to identify DVT. Absence of compressibility of a venous sector is the analysis requirement made use of, however the enhancement of Doppler (consisting of colour flow) can be valuable to precisely recognize vessels and also to verify the compressibility of a specific section.

In lots of centres, ultrasound screening is restricted to the proximal veins (from the usual femoral vein caudally to the area of the calf veins where they join the popliteal vein), for which the level of sensitivity is 97%. For DVT in the calf veins the level of sensitivity is just 73% [24]. Because the distal calf is not checked, it has actually been shown that the ultrasound needs to be duplicated 1 week later on (serial screening) if the outcome is adverse to identify DVT expanding right into the proximal veins [25]. Nonetheless, in symptomatic patients, just 20% of thrombi found are separated to the calf, as well as just 20%-30% of these thrombi will ultimately include the proximal venous system. (See Fig. 1 for the makeup of the deep veins of the leg.) As a result, regular serial screening mishandles as well as bothersome. Certainly, research studies making use of the serial screening method have actually revealed that just 1%-2% of patients that have an unfavorable first ultrasound outcome will certainly be validated to have proximal DVT after serial screening [24], [26]. Therefore, serial screening is not affordable [27].



**Fig 1: Diagram of leg veins (anterior view of right leg) [23].**

**D-dimer testing:**

D-dimer is a deterioration item of a cross-linked fibrin blood clot. Levels of D-dimer are generally raised in patients with acute venous thromboembolism, in addition to in patients with a selection of nonthrombotic problems (e.g., current significant surgical procedure, hemorrhage, injury, maternity or cancer) [28]. D-dimer assays are, as a whole, delicate yet nonspecific pens of DVT. The worth of the D-dimer assay stays with an unfavorable examination result that recommends a reduced possibility of DVT, hence making it a great "dismiss" examination with the suitable pretest likelihood. If used appropriately, consolidation of D-dimer screening right into analysis formulas streamlines the management of a patient offering with thought DVT.

• **Treatment:**

The objective of treatment for DVT is to stop the expansion of thrombus, acute PE, reappearance of thrombosis, and also the advancement of late issues such as lung high blood pressure as well as post-thrombotic disorders. The preliminary therapy generally entails accomplishing a therapeutic dosage of UFH or LMWH, or with fondaparinux.

Due to the benefits of LMWH, it is suggested over unfractionated UFH for therapy of acute DVT. UFH is, nevertheless, favored in patients with extreme kidney failing as LMWH is mostly eliminated through the kidneys. Heparin is at first supplied warfarin as well as quit after a minimum of 4 to 5 days, at which time the worldwide stabilized proportion (INR) must be within 2.0 to 3.0 (healing variety). This overlap with warfarin is essential due to the fact that elements II, IX, X will certainly not be impacted till after 5 days, thus the inherent clotting path is undamaged. The preliminary prolongation of INR is generally as a result of the result of clinical depression of factor VII which has a half-life of 5 to 7 hrs.

Warfarin continues to be the medication of selection for long-lasting treatment to stop clot development as soon as acute anticoagulation is attained. LMWH is, nevertheless, favored after long-lasting treatment of DVT in maternity as warfarin treatment is contraindicated, [29] and also in patients with cancer. Long-lasting anticoagulant treatment with LMWH is a lot more reliable compared to warfarin at avoiding frequent venous thrombosis in cancer patients without a statistically considerable bleeding danger [30].

#### 4. CONCLUSION

DVT is a potentially life-threatening clinical condition that can lead to preventable morbidity and mortality. A diagnostic pathway includes pretest probability, D-dimer assay, and venous ultrasound work as a more reliable way of diagnosing DVT. Prevention consists of both mechanical and pharmacological modalities and is offered for both inpatients and outpatients who are at risk of this disease. Family physician should take into consideration current situation of patient and work on prevention the extension of thrombus, acute PE, recurrence of thrombosis, and the progression of late complication, like pulmonary hypertension and post-thrombotic syndrome.

#### REFERENCES

- [1] White RH. The epidemiology of venous thromboembolism. *Circulation*. 2003;107:I-4–I-8.
- [2] Kahn SR, Ducruet T, Lamping DL, Arsenault L, Miron MJ, Roussin A, et al. Prospective evaluation of health-related quality of life in patients with deep venous thrombosis. *Arch Intern Med*. 2005;165:1173–1178.
- [3] Cushman M, Tsai AW, White RH, Heckbert SR, Rosamond WD, Enright P, et al. Deep vein thrombosis and pulmonary embolism in two cohorts: the Longitudinal Investigation of Thromboembolism Etiology. *Am J Med*. 2004;117:19–25.
- [4] Heit JA, Silverstein MD, Mohr DN, Petterson TM, O'Fallon WM, Melton LJ. Predictors of survival after deep vein thrombosis and pulmonary embolism: a population-based cohort study. *Arch Intern Med*. 1999;159:445–453.
- [5] Silverstein M, Heit J, Mohr D, Petterson T, O'Fallon W, Melton L. Trends in the incidence of deep vein thrombosis and pulmonary embolism: a 25-year population-based study. *Arch Intern Med*. 1998;158:585–593.
- [6] Tsai AW, Cushman M, Rosamond WD, Heckbert SR, Polak JF, Folsom AR. Cardiovascular risk factors and venous thromboembolism incidence: the Longitudinal Investigation of Thromboembolism Etiology. *Arch Intern Med*. 2002;162:1182–1189.
- [7] Nicolaides AN, Kakkar VV, Field ES, Renney JT. The origin of deep vein thrombosis: a venographic study. *Br J Radiol*. 1971;44(525):653–663.
- [8] Brooks EG, Trotman W, Wadsworth MP, et al. Valves of the deep venous system: an overlooked risk factor. *Blood*. 2009;114(6):1276–1279.
- [9] Mitchell RN. Hemodynamic disorders, thromboembolic disease and shock. In: Kumar V, Abbas AK, Fausto N, editors. *Robbins and Cotran Pathologic Basis of Disease*. 7th ed. India: Elsevier; 2009. p. 133.
- [10] Kearon C. Natural history of venous thromboembolism. *Circulation*. 2003;107(23 Suppl 1):122–130.
- [11] Kahn SR, Solymoss S, Lamping DL, Abenhaim L. Long-term outcomes after deep vein thrombosis: postphlebotic syndrome and quality of life. *J Gen Intern Med*. 2000;15(6):425–429.



- [12] Tsai AW, Cushman M, Rosamond WD, Heckbert SR, Polak JF, Folsom AR. Cardiovascular risk factors and venous thromboembolism incidence: the Longitudinal Investigation of Thromboembolism Etiology. *Arch Intern Med.* 2002;162:1182–1189.
- [13] Abdollahi M, Cushman M, Rosendaal FR. Obesity: risk of venous thrombosis and the interaction with coagulation factor levels and oral contraceptive use. *Thromb Haemost.* 2003;89:493–498.
- [14] Stein PD, Beemath A, Olson RE. Obesity as a risk factor in venous thromboembolism. *Am J Med.* 2005;118:978–980.
- [15] Cushman M, Kuller LH, Prentice R, Rodabough RJ, Psaty BM, Stafford RS, et al. Estrogen plus progestin and risk of venous thrombosis. *Jama.* 2004;292:1573–1580.
- [16] Cattaneo M. Hyperhomocysteinemia and venous thromboembolism. *Semin Thromb Hemost.* 2006;32:716–723.
- [17] den Heijer M, Willems HP, Blom HJ, Gerrits WB, Cattaneo M, Eichinger S, et al. Homocysteine lowering by B vitamins and the secondary prevention of deep vein thrombosis and pulmonary embolism: A randomized, placebo-controlled, double-blind trial. *Blood.* 2007;109:139–144.
- [18] Zakai NA, Wright J, Cushman M. Risk factors for venous thrombosis in medical inpatients: validation of a thrombosis risk score. *J Thromb Haemost.* 2004;2:2156–2161.
- [19] Baglin TP, White K, Charles A. Fatal pulmonary embolism in hospitalised medical patients. *J Clin Pathol.* 1997; 50:609–610.
- [20] Geerts WH, Pineo GF, Heit JA, Bergqvist D, Lassen MR, Colwell CW, et al. Prevention of venous thromboembolism: the Seventh ACCP Conference on Antithrombotic and Thrombolytic Therapy. *Chest.* 2004; 126:338S–400S.
- [21] White RH, Zhou H, Gage BF. Effect of age on the incidence of venous thromboembolism after major surgery. *J Thromb Haemost.* 2004;2:1327–1333.
- [22] Eekhoff EM, Rosendaal FR, Vandenbroucke JP. Minor events and the risk of deep venous thrombosis. *Thromb Haemost.* 2000;83:408–411.
- [23] Cannegieter SC, Doggen CJ, van Houwelingen HC, Rosendaal FR. Travel-Related Venous Thrombosis: Results from a Large Population-Based Case Control Study (MEGA Study) *PLoS Med.* 2006;3
- [24] Kearon C, Julian JA, Newman TE, et al. Noninvasive diagnosis of deep vein thrombosis. *Ann Intern Med* 1998; 128:663-77.
- [25] Cogo A, Lensing AWA, Koopman MMW, et al. Compression ultrasonography for diagnostic management of patients with clinically suspected deep vein thrombosis: prospective cohort study. *BMJ* 1998;316:17-20.
- [26] Wells PS, Lensing AWA, Davidson BL, et al. Accuracy of ultrasound for the diagnosis of deep venous thrombosis in asymptomatic patients after orthopedic surgery. A meta-analysis. *Ann Intern Med* 1995;122:47-53.
- [27] Perone N, Bounameaux H, Perrier A. Comparison of four strategies for diagnosing deep vein thrombosis: a cost-effectiveness analysis. *Am J Med* 2000;110:33-40.
- [28] Kelly J, Rudd A, Lewis RR, et al. Plasma D-dimers in the diagnosis of venous thromboembolism. *Arch Intern Med* 2002; 162:747-56.
- [29] Hyers TM, Agnelli G, Hull RD, et al. Antithrombotic therapy for venous thromboembolic disease. *Chest.* 2001; 119(1 Suppl):176S–193S.
- [30] Lee AY, Levine MN, Baker RI, et al. Low-molecular-weight heparin versus a coumarin for the prevention of recurrent venous thromboembolism in patients with cancer. *N Engl J Med.* 2003;349(2):146–153.