

Deep Venous Thrombosis



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KEYWORDS

- Deep venous thrombosis • Venous thromboembolism • Anticoagulation
- Novel oral anticoagulant • Vitamin K antagonist

KEY POINTS

- Deep venous thrombosis (DVT) is part of the venous thromboembolic spectrum and is a relatively common condition.
- Evaluation and diagnosis are performed by risk stratification utilizing the Wells score, d-dimer testing, and duplex ultrasound.
- Treatment depends on individual conditions, but usually consists of anticoagulation for a finite or infinite period of time, depending on the suspected etiology of the thrombosis.
- Adjunctive therapies such as caval filters, thrombolysis, and clot extraction play specific and limited roles.
- Risks and benefits of anticoagulation or other modalities should be discussed with and individualized for patients.
- An adjunctive search for causes of venous thromboembolism (VTE) should be investigated, beginning by looking for causes of provoked DVT, considering malignancy in the appropriate population, and finally assessing personal and family history in consideration of risks for thrombophilia.
- Upper Extremity DVT is a rare condition that is usually associated with catheters, implantable devices, malignancy, or thrombophilia and is primarily treated with anticoagulation.

INTRODUCTION

Deep venous thrombosis (DVT) is part of a spectrum of venous thromboembolic disorders that includes superficial thrombophlebitis and pulmonary embolism.¹ DVT may be defined as “the formation of a blood clot within a deep vein.”² Although DVT most commonly occurs in the deep veins of the lower leg and thigh, it may also occur within the upper limb deep veins, visceral veins, and even the vena cava.²

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EPIDEMIOLOGY

The true incidence of DVT is unknown. The estimated risk for first time venous thromboembolism (VTE) is 100 cases per 100,000 persons per year, yielding an annual incidence of 0.1%³ and generating an annual US incidence of over 1 million patients per year. The incidence of DVT appears to be equal between the sexes,⁴ although women present 1.6 times more often for evaluation of suspected DVT.⁵ DVT occurs more commonly as people age, with the rate in persons aged 60 years and older rising to nearly 1%.⁶ VTE remains a disease with high morbidity and mortality. The case fatality rate for VTE has been reported to be 10.6% at 30 days and 23% at 1 year.⁷ With prompt diagnosis and treatment, mortality declines dramatically. The 10-year recurrence rate after diagnosis of first-time DVT is approximately 25%. This peaks at 6 months and gradually declines to 2% per patient per year after 3 years, but is dependent on the etiology of the thrombosis.⁸ The estimated overall mortality from VTE in the United States ranges from 60,000 to 100,000 deaths per year.⁹ A subset of DVT is upper extremity DVT (UEDVT), which is far less common than lower extremity DVT (LEDVT). The prevalence of UEDVT is 0.15%, which constitutes about 1% to 4% of all DVTs.¹⁰ Survival rates of patients with UEDVT are also lower than those with LEDVT.¹⁰

PATHOPHYSIOLOGY

Virchow's triad of alterations in blood flow, endothelial vascular injury, and derangements in the constitution of blood remain relevant over 150 years after they were first described.¹¹ Stasis, whether caused by obstruction or immobilization, is thought to prevent the clearance and dilution of activated clotting factors.¹² Injury to the vascular endothelium prevents the inhibition of coagulation and activates the clotting cascade. A propensity toward clotting secondary to hypercoagulability may be inherited or acquired.¹²

DVT commonly begins in the calf, and, less commonly, the proximal veins of the lower extremity. Obstruction of venous outflow leads to swelling and pain with the subsequent activation of the inflammatory cascade.¹² Many DVTs isolated within the calf veins will spontaneously resolve and are unlikely to embolize and cause pulmonary embolism (PE).¹³ Twenty-five percent of isolated calf vein DVTs will subsequently extend into more proximal deep veins.¹⁴ It is estimated that 50% of these may embolize, resulting in PE.¹⁵ DVT occasionally compromises vascular flow within the extremity, resulting in phlegmasia cerulea dolens, a painful and limb-threatening vascular disorder.¹²

There are many risk factors for the development of DVT (**Table 1**). Pregnancy increases the risk secondary to mechanical obstruction of the inferior vena cava, relative immobility, and hormonal influence. The increase in risk is approximately 0.13% and begins in the first trimester.² Oral contraceptive (OCP) use roughly doubles the risk of VTE in patients, but the overall risk remains low because of the use of OCPs in generally healthy and young patients.² Malignancies may double the risk of developing a DVT, although this risk is highly dependent upon the type of cancer, the use of chemotherapy or surgical treatment options, and immobility.² **Table 1** shows estimated relative risks for multiple conditions.¹²

In hospitalized surgical patients of all types, older data² suggest that up to 25% of postoperative patients suffer VTE when not given prophylaxis, with higher rates (40%–60%) noted in postoperative orthopedic patients. Newer data suggest that with appropriate prophylaxis, this rate worldwide has dropped to 1%, and is perhaps 2% to 3% in the United States.² Medical patients admitted to the hospital also have about a 25%

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