

HOSPITAL PHYSICIAN®

INTERNAL MEDICINE BOARD REVIEW MANUAL

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Venous Thromboembolism

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Venous Thromboembolism

EPIDEMIOLOGY AND PATHOGENESIS

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EPIDEMIOLOGY

Venous thromboembolism (VTE) is defined by the presence of either deep venous thrombosis (DVT) and/or pulmonary embolism (PE). The exact incidence of VTE in the United States is unknown. The incidence of symptomatic first-time VTE adjusted for age and sex for the U.S. population is estimated to be between 70 and 113 cases per 100,000 person-years. These data are derived from studies of Caucasian populations.¹ The incidence of PE relative to DVT depends on the inclusion of autopsy data. When autopsy data are not included, one third of patients with symptomatic VTE have PE and two thirds have DVT alone. When autopsy data are included, the proportion is reversed—55% of patients have PE and 45% have only DVT.¹

The incidence of VTE increases with age. After age 40 years, the risk of VTE doubles with each decade. The incidence appears to be similar in males and females.² Asian-Pacific Islanders and Hispanics have a 2.5 to 4-fold lower risk of symptomatic VTE compared with Caucasians and African Americans.² There may also be seasonal variation, with VTE being more common in the winter months.² Depending on the series, up to 50% of first-time VTE patients have no identifiable risk factor and VTE is classified as idiopathic.¹ Of these idiopathic cases, up to 10% of patients have an occult cancer at the time of diagnosis.³

RISK FACTORS

In the mid-19th century, Rudolf Virchow identified factors contributing to thrombosis. He postulated that injury to the blood vessel wall (endothelial damage), changes in blood flow (stasis), and alterations in blood constituents (hypercoagulability) are the main causes of thrombus formation. Many predisposing factors for VTE (**Table 1**) affect 1 or more components of Virchow's triad.²

Surgery

Surgery is a risk factor for VTE because of direct

injury to the vascular endothelium and postoperative periods of immobilization or stasis. Major general surgery, requiring more than 30 minutes of anesthesia time and involving the thorax or abdominal cavities, is associated with a 15% to 30% incidence of VTE.⁴ Major orthopedic surgery, especially involving the hip and knee, is associated with an even higher (40%–60%) incidence of VTE. Finally, trauma surgery patients and neurosurgery patients with spinal cord injury have a very high (60%–80%) risk of VTE. It should be emphasized that these rates refer mainly to asymptomatic DVT detected by screening. However, there is good evidence that such thrombi correlated with symptomatic outcomes and death from PE.⁴

Malignancy

Cancer is a hypercoagulable state but may also cause endothelial damage as a result of tumor invasion of blood vessels. Patients with cancer have a 7-fold higher risk of VTE. The risk may be even higher in patients with advanced disease or metastasis.⁵ Chemotherapy conveys an additional risk.⁶ Patients with VTE have a 3-fold higher risk of being diagnosed with cancer within 3 months, especially if they are older or present with idiopathic thrombosis.⁷ Thus, patients with idiopathic VTE need a thorough history and physical examination as well as screening for age- and sex-appropriate malignancies.

Prior VTE

Prior VTE is a strong independent risk factor for subsequent VTE. The risk is even higher in those patients for whom there was no cause identified for the first event.⁸

Pregnancy and Postpartum

The antenatal and postpartum period is associated with a 5-fold increase in VTE,⁹ with an estimated incidence of 1 in 1000 pregnant women.¹⁰ It is thought that the hypercoagulable state of pregnancy exists to protect against maternal hemorrhage, which remains the leading cause of maternal death in the developing world. In the United States, the leading cause of maternal death is pulmonary embolism.¹¹ The risk extends through the postpartum (6 weeks after delivery) period, and venous clots are most often found in the left lower extremity.¹⁰