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Deep Vein Thrombosis/Pulmonary Embolism

Description

Deep vein thrombosis (DVT) is a blood clot that forms in a deep vein, most commonly in veins of the calf or thigh, and partially or completely obstructs blood flow. The clot may break off and travel to the vessels in the lung, causing a life-threatening pulmonary embolism (PE). While DVT and PE can occur at any time, the risk is increased during and after periods of immobility. Unlike blood clots in arteries, which result from a chronic process of plaque formation or atherosclerosis, clots in veins usually develop rapidly in response to immediate risk factors.

Risk Factors

DVT/PE is a multifactorial disease, caused by the interaction of inherited, acquired, behavioral and environmental, risk factors (1). Inherited abnormalities in components of the coagulation system, such as deficiencies in anticoagulant proteins, as well as the Factor V Leiden and Prothrombin G20210A gene variants, lead to hypercoagulability and an increased tendency to develop venous blood clots (2-4). Acquired conditions, including antiphospholipid syndrome and systemic lupus erythematosus, are also known to increase hypercoagulability (5). Use of oral contraceptives and hormone replacement therapy, pregnancy, cancer, recent surgery (especially abdominal and orthopedic surgery), increased age, obesity, and history of previous blood clots are other factors that increase risk for DVT/PE (6). In addition, venous stasis, decreased movement of blood through the veins, significantly elevates risk for formation of abnormal venous blood clots. Circumstances such as paralysis, prolonged bedrest, hospitalization, and injury cause immobilization of the extremities and increased risk for DVT/PE (6,7). Several studies have demonstrated an association between travel and DVT/PE. This purported relationship may be the result of both immobilization related to traveling and changes in the coagulation system (8,9).

Occurrence

The incidence of DVT/PE is 1-2 cases per 1000 general population annually (10,11). Twenty-five percent of patients with pulmonary embolism die suddenly, and nearly a

third of patients with DVT have post-thrombotic syndrome, a disabling condition that adversely affects quality of life (12,13).

Risk for Travelers

People at increased risk for DVT include those who have had DVT/PE in the past, have undergone recent surgery (especially abdominal or orthopedic surgery), are pregnant, are taking oral contraceptives or hormone replacement therapy, have a malignancy, have restricted mobility, or have genetic or acquired blood-clotting abnormalities. People with these conditions should consult with a physician before traveling.

Several studies have demonstrated that airplane travel, especially long-haul (>8 hour) air travel, may alter levels of blood clotting factors and increase the risk for DVT/PE (9). Results from other studies, however, show no association between travel and propensity to develop blood clots (14,15). Some data suggest that travel may enhance the risk of DVT/PE most significantly in individuals with other risk factors for blood clots (9). Regardless of conflicting reports from clinical studies, immobility is a well-known risk factor for DVT/PE, and since travel by all methods entails a period of immobility, travelers should be aware of the signs and symptoms of possible DVT/PE during and after traveling.

Clinical Presentation

Symptoms of DVT of the leg include swelling, redness or discoloration, pain, and increased warmth over the skin. Once a clot has traveled to the lungs, common symptoms of pulmonary embolism are chest pain, shortness of breath, dizziness, fainting, anxiety, or rapid pulse. Pulmonary embolism may occur in the absence of overt signs of DVT.

Since symptoms of DVT and PE may mimic those of other common conditions, affected individuals should seek prompt attention by a physician. DVT symptoms may be difficult to distinguish from those of an injury, muscle strain, or skin infection, while symptoms of PE may be mild and nonspecific or acute, resembling heart attack or stroke. Specialized imaging tests, such as duplex venous ultrasound, venography, computed tomography (CT) scans, and magnetic resonance imaging (MRI), are needed to make a definitive diagnosis of DVT. Helical CT or ventilation perfusion scans of the lungs are commonly used to diagnose PE (16).

Prevention

During travel and other extended periods of immobility, measures should be taken to alleviate venous stasis. Travelers should stay hydrated, wear loose-fitting clothing, and make efforts to walk and stretch legs and arms at regular intervals. Compression stockings or support hose may be recommended by a physician to reduce leg swelling during extended air travel and encourage blood flow in deep veins of the leg. People who are at higher risk for DVT/PE, as determined by a health-care provider, may be advised to use prophylactic anticoagulant medication, such as low molecular-weight heparin,

during travel. There are no convincing data to suggest that using aspirin as a preventive measure prior to the immobility associated with travel will prevent abnormal clotting and PE.

Treatment

Treatment for DVT/PE is aimed at preventing clot progression and embolization and at reducing the risk for a recurrent clot. Anticoagulant medications are the most commonly prescribed treatments for deep vein thrombosis and pulmonary embolism. Thrombolytic drugs may be used in certain circumstances to treat extensive or stubborn clots (17).

Anticoagulants

Medical treatment for DVT/PE most frequently entails heparin, to achieve a rapid anticoagulation response, followed by a long-term course of the oral anticoagulant warfarin (Coumadin). Heparin can be administered in unfractionated form, by infusion, or as subcutaneous low-molecular weight heparin. Low-molecular weight heparin has a longer therapeutic half-life than unfractionated heparin and can be used on an outpatient basis. Warfarin is typically given together with heparin for 4-5 days until active anticoagulation is achieved (as measured by the INR or International Normalized Ratio of clotting time). Treatment with warfarin continues for 6 weeks and often longer, depending on the status of clot resolution and assessed risk for recurrence or complications. During treatment with warfarin, patients require regular blood tests to monitor INR levels. Patients may need to adhere to dietary restrictions, because vitamin K, found in green leafy vegetables and other food, can alter the anticoagulant effects of warfarin. These restrictions should be taken into account in counseling about food precautions while traveling (see Chapter 2), and the patient should be advised to consult with the physician managing the anti-coagulation.

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