What Is Pulmonary Embolism?

A **pulmonary embolism (PE)** is a blood clot that blocks a blood vessel in the lung.

A PE is usually caused by a blood clot that forms in a vein (usually in the leg or pelvis, or less commonly, in the arm) and travels through the bloodstream to the lungs. In the US, PE affects approximately 370,000 people per year and is estimated to cause 60,000 to 100,000 deaths per year.

**Signs and Symptoms of Pulmonary Embolism**

Patients with a small PE may experience no symptoms. Larger PEs commonly cause shortness of breath and chest pain. Very large PEs can limit the heart’s ability to deliver blood to the lung, causing low blood pressure (shock), fainting, or death.

**Risk Factors for Pulmonary Embolism**

Risk factors for PE include a personal or family history of blood clots, older age, current diagnosis of cancer, use of estrogen-containing oral contraceptives, pregnancy, and being postpartum (up to 3 months after childbirth). Other factors that increase the risk of PE include recent surgery, fracture or traumatic injury, and immobilization (such as a long airplane or car trip).

**Diagnosis of Pulmonary Embolism**

The first step of diagnosis involves determining the likelihood of PE using a validated scoring system or the clinical opinion of a treating clinician. Patients at low or moderate risk of PE typically undergo blood testing for D-dimer, which is a by-product of blood clotting. If the D-dimer level is low, no further evaluation for PE is needed. An imaging study should be ordered for all patients at high risk of PE and those at low or intermediate risk who have elevated D-dimer.

The preferred imaging test is a computed tomography (CT) pulmonary angiogram, which uses intravenous contrast to identify blood clots in the pulmonary artery.

**How Is Pulmonary Embolism Treated?**

Treatment of PE typically involves use of a blood thinner (anticoagulant), which is started immediately after the diagnosis is made and is usually continued for 3 to 6 months. Patients with certain persistent risk factors for PE (such as an inherited coagulation disorder) may be prescribed extended or lifelong anticoagulation therapy.

The preferred medication for most patients with PE is a direct oral anticoagulant (DOAC), which includes apixaban, rivaroxaban, edoxaban, and dabigatran. Vitamin K antagonist drugs (such as warfarin) are recommended for patients with certain conditions associated with increased risk of blood clots (such as antiphospholipid antibody syndrome). Pregnant patients with PE should be treated with low-molecular-weight heparin because this medication does not cause fetal anomalies.

Patients at high risk of death from PE (those with shock) without an increased risk of bleeding should receive a clot-dissolving medication. Other treatment options for high-risk PE may include catheter-based therapy or surgery to remove blood clots from the lung.

**Potential Consequences of Pulmonary Embolism**

Some patients develop post-PE syndrome, which may include shortness of breath and decreased health-related quality of life several months after starting anticoagulation. Approximately 1% to 4% of patients with an acute PE develop chronically elevated pressure in the pulmonary artery (chronic thromboembolic pulmonary hypertension). This condition has a mortality rate of 25% to 30% at 3 years, if untreated, but can be cured or improved with surgery.