**Pulmonary Embolism**

**Etiology**

Pulmonary embolism is the blockage of the main artery (pulmonary artery) supplying blood to the lungs. A pulmonary embolus usually develops as a result of thrombi which originates from the deep venous system of the lower extremities. There are three main predisposing factors that influence the formation of a thrombus in a patient, which form the Virchow triad; blood hypercoagulability, stasis or turbulence of blood flow and endothelial injury (Choi, Lee, Han, & Jung, 2016). Other causes of pulmonary embolism are multifactorial. Some of the listed courses of pulmonary embolism from the different literature include immobilization, pregnancy, surgery and trauma, hereditary factor, malignancy, acute medical illness and oral contraceptives and estrogen replacement.

**Epidemiology**
 In the United States, incidences of pulmonary embolism are estimated at 1 case per 1000 people every year. From 2008 to date, most studies have revealed that the use of computer tomography (CT) scanning in the diagnosis of the health complication has resulted to an increase in the reported cases of pulmonary embolism (Narain, & Rutgers University, 2016). The health condition is present in about 60 to 80% of DVT patients, in as much as more than half of these patients are asymptomatic. In hospitalized patients, pulmonary embolism has been reported to be the third most common cause of death in the US, with more than 650,000 cases reported every year.

**Pathophysiology**

Pulmonary embolism is associated with both hemodynamic and respiratory consequences. Some of the acute respiratory consequences include hypoxia, increased alveolar dead space and hyperventilation. Additionally, the patient might experience pulmonary infarction and regional loss of surfactant. Hypoxia is however developed as a result of the intrapulmonary shunt, intracardiac shunt via the foramen ovale, ventilation-perfusion mismatch and reduced cardiac output. Hemodynamic consequences of pulmonary embolism include reduced cross-sectional area of the pulmonary vascular bed that may lead to an increment in the resistance of pulmonary vessels. A severe increase in the afterload may lead to right ventricular failure.

**Clinical Manifestations**

Most patients with pulmonary embolism are usually asymptomatic for the signs and symptoms of this condition. Studies reveal that most patients who died from pulmonary embolism unexpectedly complained of nagging symptoms of hypoxia, pleuritic chest pain and shortness of breath, weeks before their death. About 40% of these patients had been seen by a doctor weeks before their death (Righini, Robert-Ebadi, & Le, 2017). Some of the risk factors that indicate the presence of pulmonary embolism include, malignancy, venous stasis, hemolytic anaemias, homocystinuria, venography, inflammatory bowel disease, hypercoagulable state and surgery and trauma, among others.

Physical exam findings for pulmonary embolism is grouped into four main categories, massive pulmonary embolism, acute embolism without infarction, Acute pulmonary infarction and multiple pulmonary emboli (Righini, Robert-Ebadi, & Le, 2017). The presenting signs of pulmonary embolism may vary from the catastrophic hemodynamic collapse that occurs suddenly to gradually progressive dyspnea. Some of the atypical physical exam findings of pulmonary embolism include abdominal pain, seizures, wheezing, fever, syncope, productive cough, flank pain, new onset of atrial fibrillation and delirium, especially in older patients. Some of the red flag symptoms of pulmonary embolism include Sudden onset of chest pain, especially during exercise, which occurs for an extended period of time (more than 15 minutes), associated with shortness of breath and radiates to the left arm or jaw.

**Diagnosis**

 Computer tomography pulmonary angiography is the most common and the most efficient standard imaging procedure that is used for the diagnosis of pulmonary embolism (PE). This diagnostic tool was considered the standard of care for the detection of PE by the American College of Radiology (ARC) in their 2011 guideline (Frigini et al., 2017)). A chest radiograph is not very specific since it cannot confirm or exclude PE, but instead, it provides a guide for further investigations. The sensitivity of perfusion scanning is higher than that of a CT scan in the detection of PE. However, the choice between the two depends on local equipment and patient factors such as the ability to breath hold and normal chest radiograph. An abnormally increased RV/LV diameter ratio on a traverse CT section is the main indication of PE.

**Patient Education**

 Patients with pulmonary embolism should adhere strictly to the treatment regimen for therapeutic compliance. The patient should also be guided on the measures to take in case of any bleeding complications. Since most patients are prescribed low molecular weight heparin or warfarin as the most appropriate anticoagulants, upon discharge, they should be informed of the various drug-drug interactions and drug-food interactions to avoid unwanted complications (Liang, Ali, Avgerinos, & Chaer, 2018). Follow-up is very important, especially for therapeutic drug monitoring.
**References**

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