PULMONARY EMBOLISM

Pulmonary embolism (PE) remains a big challenge - widely under diagnosed and inappropriately treated with suboptimal outcomes. Rapid and accurate diagnosis of pulmonary embolism improves survival and quality of life. Early treatment decreases mortality and the likelihood of thromboembolic pulmonary hypertension. It is imperative to consider pulmonary embolism as a diagnostic possibility and order the appropriate diagnostic tests and institute timely and effective therapy. Higher level of index of suspicion clinches the diagnosis as the presentation may be atypical and not 'classical'.

The diagnosis of pulmonary embolism had been enigmatic and not straight forward! Arterial blood gas analysis and calculation of alveolar-arterial oxygen tension difference are not reliable tools to diagnose PE. D-dimer assay has evolved as the principal blood-screening test. D-dimer testing is highly sensitive and has a very high negative predictive value, so it is an excellent screening test for emergency patients. At Brigham and Women's Hospital's Emergency Department, with 1106 consecutive assays for suspected PE, the sensitivity was 97% and the negative predictive value was 99.6%. D-dimer is less useful for patients who are already hospitalized because the levels are elevated in many illnesses that mimic PE, such as pneumonia, myocardial infarction, cancer, sepsis, pregnancy, and those in the postoperative state.

Different modalities have been employed for the diagnosis of PE with variable results. Uptill recently ventilation-perfusion scanning had been regarded as the investigation of choice where as pulmonary angiography was considered as 'the gold standard'. But now computed tomographic (CT) scanning of the chest has revolutionized the diagnostic approach to suspected pulmonary embolism.

Ventilation-perfusion lung scanning had always been problematic because it rarely provided a definitive "high probability" or "normal" result. Its ambiguity led to multiple dubious descriptions. Many clinicians found it perplexing and adding to confusion. Selective pulmonary angiography, had been hailed as "gold standard," but was never liked by the patients. The test demanded holding of breath for about 30 seconds. Each lung required at least two separate angiographic views and, therefore, at least two injections. The passage of a catheter through the right ventricle in patients prone to arrhythmia could provoke nonsustained ventricular tachycardia. Even in expert hands, the studies are often difficult to interpret beyond third-order vessels.

Chest CT scanning for the diagnosis of pulmonary embolism was hailed by the medical community as an improvement, and it proved its worth in many rigorous studies. By 2001, CT scanning was being used more often than lung scanning to investigate suspected pulmonary embolism. The images offered are dramatic in clarity, rapidly acquired, and accurate in delineating the proximal pulmonary arterial tree. This noninvasive technology has evolved rapidly. With spiral CT, thrombus is directly visualized, and both mediastinal and parenchymal structures are evaluated, which may provide important alternative or additional diagnoses. However, limitations for the accurate diagnosis of small peripheral emboli, with a reported miss rate of up to 30% with single-slice spiral CT so far,

prevented the unanimous adoption of spiral CT as the new standard. New multislice CT scanners can provide information about pulmonary embolism that can be helpful in planning emergency surgery, catheter embolectomy, or thrombolysis. The latest generation of scanners can diagnose tiny submillimeter pulmonary embolism in sixth-order vessels and requires a breath-hold of less than 10 seconds. These thrombi are so small that their clinical significance is uncertain.

The diagnosis of pulmonary embolism is only one aspect of CT examination. CT scanning can image the legs, pelvis, and chest in a single study, helping to identify the source of the clot. Regardless of PE, CT scanning can identify small new lung cancers or pneumonia not visualized on chest radiography. CT can help identify patients at high risk for death or major in-hospital complications. The prognosis can be assessed by detecting right ventricular enlargement on reconstructed four-chamber views. Right ventricular enlargement, defined as a ratio of the diameter of the right ventricle to the left ventricle that is more than 0.9, is a powerful predictor of outcome. In a series of 431 patients with pulmonary embolism at Brigham and Women's Hospital in Boston, right ventricular enlargement independently claims an increase in mortality by a factor of five. Rapid risk stratification may help clinicians select the most appropriate candidates for thrombolysis or embolectomy.

To conclude, the currently recommended and validated strategy proposes using a clinical probability assessment, D-dimer screening, and multislice chest CT scanning. The need for venous ultrasonography in patients whose CT scans are negative is not supported by any evidence. This approach should streamline and expedite diagnosis, decrease the delay before the institution of therapy, and ultimately reduce the rates of death, chronic thromboembolic pulmonary hypertension, and the post-thrombotic syndrome. Emphasis on prevention and practical measures adopted can decrease the frequency in most post operative patients.

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