

PULMONARY EMBOLISM DIAGNOSIS

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The diagnosis of pulmonary embolism (PE) severe enough to cause or contribute to death in autopsied patients was not considered antemortem in about 70% of patients. The key to improving this unfortunate statistic is to always be vigilant. Many clinical observations, some recent, contribute to suspecting the diagnosis. Contrary to prior opinion, the onset of dyspnea in acute PE may be over hours or days. Even those with the most severe PE (shock or loss of consciousness) may not be short of breath. Dyspnea on exertion may be the only symptom. Orthopnea may be a symptom of PE. Pleuritic pain occurs more frequently than hemoptysis and friction rub is rare. A low probability prediction rule score may not exclude even large PE. In general, however, dyspnea or tachypnea or pleuritic pain is more frequent with large PE and is often absent with small PE. Several prediction rules for objective clinical probability assessment have been developed, and the probabilities of PE are similar. Intuitive assessment by experienced physicians also gives similar results.

A normal D-dimer by the rapid ELISA method is the most sensitive rapid D-dimer test for determining if PE or deep venous thrombosis (DVT) might be present. A normal D-dimer in combination with a low or moderate probability clinical assessment safely excludes PE in about 30% of patients in emergency departments, making imaging unnecessary.

Conventional invasive pulmonary angiography has been replaced by CT angiography, although superselective injections permit detail in small vessels not possible with CT angiography. Ventilation-perfusion (V-Q) lung scans are infrequently used because in the first PIOPED study, 73% were nondiagnostic (low probability or intermediate probability). Even with the addition of clinical assessment, 63% showed discordant clinical and V-Q findings, making them nondiagnostic.

By 2001, the use of CT angiography exceeded the use of V-Q scans. In the US, 98% of hospitals with 50 or more beds have CT. In PIOPED II, multidetector CT (mostly 4-slice) was inadequate in 6%. Among the remainder, sensitivity for detection of PE was 83%. Sensitivity improved to 90% with use of venous phase CT venography in combination with CT angiography. Specificity was high with CT angiography alone or with CT venography (95% to 96%). Positive predictive value was 97% in main of lobar arteries, but lower in more distal vessels. The positive and negative predictive values of CT angiography were high with concordant clinical assessments, but with discordant clinical assessments, the diagnosis was uncertain.

The risk of radiation with CT angiography is a concern. Risks of radiation are highest in young women, particularly because of breast radiation. Radiation from CT venography can be reduced by scanning only the thighs. Pelvic veins rarely have DVT alone. Also, discontinuous images (5 mm collimation, skip 15 mm) are nearly as accurate as continuous helical images. Venous compression ultrasound and CT venography are diagnostically equivalent, and ultrasound may be substituted for CT venography. Whether CT venography or compression ultrasound is needed has been questioned. Among patients with suspected PE, 6% to 18% with venous thromboembolic disease showed a positive leg test although the CT angiogram

was negative. On the other hand, only 1.3% to 3.4% of patients with suspected PE had a positive CT venogram or venous ultrasound with a negative CT angiogram.

Gadolinium enhanced magnetic resonance angiography is being evaluated for PE in PIOPED III. Nephrogenic systemic fibrosis/nephrogenic fibrosing dermopathy is extremely rare (about 215 cases reported worldwide), but is a concern in patients with poor renal function or acute renal insufficiency.

With the development of a very low probability interpretation of V-Q scans since the conclusion of PIOPED I, in a predominantly outpatient population (less complex patients), nondiagnostic interpretations were reduced to 27%. In patients with a normal chest radiograph, nondiagnostic interpretations were reduced even further, to 11%. It may be, therefore, that in women under aged 50 years with a normal chest radiograph, in whom the risk of radiation from CT angiography is highest, a perfusion lung scan alone might be the imaging test of choice.

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