Summary

PE is a common cardiovascular and cardiopulmonary illness with an incidence in the United States that exceeds 1 per 1000 and a mortality rate 15% in the first 3 months after diagnosis. This makes PE possibly as deadly an illness as acute myocardial infarction. Nevertheless, the lay public has not been well educated about PE. Consequently, early detection and prompt presentation for medical evaluation have lagged far behind the public awareness of acute coronary syndromes and stroke.

Several baseline diagnostic tests are often carried out in patients presenting with one or more chest symptoms before a specific diagnostic management strategy for PE is initiated. These include laboratory measurement of parameters for infection such as C-reactive protein (CRP) and white blood cell count and also an arterial blood gas analysis. An electrocardiogram (ECG) and chest X-ray are generally also performed and the results could give rise to a suspicion of PE .

Although increasingly sophisticated clinical algorithms for “bed-side” exclusion of pulmonary embolism (PE) are being developed, based mainly on a negative d-dimer test, there is a high and seemingly increasing demand for imaging tests for suspected PE.

Chest radiographs are useful for excluding other diseases (e.g., pneumonia or congestive heart failure) and are critical for interpretation of radionuclide lung scans. However, plain radiographs are almost useless for the specific diagnosis of pulmonary embolism. .

For the past three decades, combined ventilation and perfusion scans have been the imaging technique of choice for the diagnosis of pulmonary embolism. Because it is less specific than CT angiography and a definitive diagnosis cannot be made in most patients with pulmonary embolism, it has assumed a lesser role in most centers.

Invasive pulmonary angiography is still regarded by some as the gold standard technique but in reality is rarely ever used as such. The main reason for the latter appears to be the invasiveness of this procedure . More importantly, there is mounting evidence for the limitations of this technique for the unequivocal diagnosis of isolated peripheral pulmonary emboli .

Contrast-enhanced magnetic resonance (MR) angiography has been evaluated for the diagnosis of acute PE; however, the acquisition protocols that are currently available for MR pulmonary angiography lack sufficient spatial resolution for reliable evaluation of peripheral pulmonary arteries . More importantly, this modality has not seen widespread use in the acutely ill patient with suspected PE due to lack of general availability, relatively long examination times, and difficulties in patient monitoring.

The introduction of multidetector-row CT (MDCT) into clinical radiology has decisively reemphasized and reinvigorated the cardinal role of CT as the premier imaging modality for imaging the pulmonary circulation. The specific requirements of diagnostic imaging in the high-resolution environment of the chest, with fast moving organs and the need for image acquisition during apnea, are ideally met by multidetector-row

CT technology. The scan speed of current generation MDCT scanners translates into the ability of scanning the entire chest within a few seconds. Despite sub-millimeter resolution, this results in motion-free images even in the sickest of patients. Use of thin slices was shown to significantly improve the detection of minute vascular pathology, such as small peripheral pulmonary emboli .

The most important advantage of CT over other imaging modalities is that both mediastinal and parenchymal structures are evaluated, and thrombus is directly visualized .

For all practical purposes CT has become established as the first-line modality for imaging patients with suspected PE. Computed tomography has become an attractive means for a safe, highly accurate, and cost-effective diagnosis of pulmonary embolism. The lack of a clinically available gold standard for the diagnosis of PE suggests that the medical community should replace theoretical and academic discussions on the relative value of different imaging modalities with more realistic approaches based on patient outcome.