

Dual-section helical computed tomography had high sensitivity and specificity for detecting acute pulmonary embolism

Qanadli SD, El Hajjam M, Mesurole B, et al. Pulmonary embolism detection: prospective evaluation of dual-section helical CT versus selective pulmonary arteriography in 157 patients. *Radiology*. 2000 Nov;217:447-55.

QUESTION

In patients with suspected acute pulmonary embolism (PE), what is the diagnostic accuracy of dual-section helical computed tomography (CT)?

DESIGN

Blinded comparison of pulmonary dual-section helical CT with pulmonary digital subtraction arteriography, the diagnostic standard.

SETTING

Hospital radiology department in Boulogne, France.

PATIENTS

158 patients who were 18 to 75 years of age (mean 58 y, 54% women) and had clinically suspected acute PE. Exclusion criteria were clinical signs of life-threatening PE, renal failure, history of allergy to iodinated contrast media, or refusal to participate.

DESCRIPTION OF TEST AND DIAGNOSTIC STANDARD

Dual-section helical CT was done in a caudo-cranial direction (begun at the level of the inferior wall of the right ventricle and ending above the aortic arch for imaging the main,

lobar, segmental, and subsegmental pulmonary arteries of the lower, middle, and upper lobes). 130 patients held their breath (103 of whom held their breath for the entire acquisition time), and 28 patients breathed quietly during imaging. Pulmonary digital subtraction arteriography was done by using a transfemoral venous approach and the Seldinger technique. 2 projections, postero-anterior and oblique, were imaged in each lung. All patients had pulmonary angiograms done first and then helical CT within 12 hours. CT images and arteriograms were reviewed independently, and reviewers were blinded to the other test result.

MAIN OUTCOME MEASURES

Sensitivity, specificity, and positive and negative likelihood ratios for detecting PE.

MAIN RESULTS

The prevalence of PE in the study population was 39% (62 of 157 patients, 1 patient

had an inconclusive arteriogram). Sensitivity, specificity, and likelihood ratios for the 151 patients who had conclusive results on CT are shown in the Table. Of the 6 patients with inconclusive results on CT, 3 were diagnosed as having PE by using arteriography. When inconclusive results were included to maximize CT error, sensitivity decreased to 90%, and specificity decreased to 94%.

CONCLUSION

Dual-section helical computed tomography had high sensitivity and specificity for diagnosing pulmonary embolism.

Source of funding: No external funding.

For correspondence: Dr. S.D. Qanadli, Department of Radiology, Ambroise Paré Hospital-René Descartes Paris V University, 9 avenue Charles de Gaulle, 92104 Boulogne, France. FAX 33-1-49-09-55-47.

Test characteristics for dual-section helical computed tomography to detect pulmonary embolism*

Sensitivity (95% CI)	Specificity (CI)	+LR	-LR
95% (86 to 99)	97% (91 to 99)	29.1	0.05

*Diagnostic terms defined in Glossary; CIs and LRs calculated from data in article.

COMMENTARY

The diagnosis of PE remains a problem. Diagnostic algorithms rely on tests that are sensitive but not specific (lung scans), invasive and expensive (pulmonary arteriography), or insensitive for calf-vein thrombi and that therefore must be repeated (compression ultrasonography) (1).

Helical CT is available and safe and often provides alternative diagnoses. Unfortunately, the role of helical CT for the diagnosis of PE remains uncertain (2, 3). Many experts believe that helical CT can diagnose PE but that a negative helical CT scan cannot rule out a diagnosis. A critical issue is the insensitivity of helical CT for PE that is limited to subsegmental vessels. Thus, it may not be safe to withhold anticoagulants from patients with normal helical CT scans.

Dual-section helical CT uses a double array of detectors to enhance the resolution of pulmonary vessels. Qanadli and colleagues compared dual-section helical CT with pulmonary arteriography, using a methodologically sound study design. The investigators report high sensitivity and specificity for the diagnosis of PE with a high degree of agreement between independent scan readers. They also detected thromboembolism, limited to subsegmental vessels, in 3 of 4 patients.

Is dual-section helical CT ready for "prime time" as the initial diagnostic test for PE? The answer is "no." The study by Qanadli and colleagues is promising and important, but others must reproduce the results. Furthermore, clinical studies must document outcomes for untreated patients with a negative dual-section helical CT scan.

*C. Gregory Elliott, MD
LDS Hospital
Salt Lake City, Utah, USA*

References

1. Tapson VF, Carroll BA, Davidson BL, et al. The diagnostic approach to acute venous thromboembolism. Clinical practice guideline. American Thoracic Society. *Am J Respir Crit Care Med*. 1999;160:1043-66.
2. Mullins MD, Becker DM, Hagspiel KD, Philbrick JT. The role of spiral volumetric computed tomography in the diagnosis of pulmonary embolism. *Arch Intern Med*. 2000;160:293-8.
3. Rathbun SW, Raskob GE, Whitsett TL. Sensitivity and specificity of helical computed tomography in the diagnosis of pulmonary embolism: a systematic review. *Ann Intern Med*. 2000;132:227-32.