

the composite end point (death or nonfatal AMI) in patients with acute coronary syndromes who did not have persistent ST-segment elevation.

Comments

Glycoprotein IIb/IIIa inhibitors are an exciting new class of antiplatelet drugs, but their role in emergency department (ED) practice remains unclear. The 3 most relevant trials, PURSUIT, PRISM-PLUS and PARAGON (the “3-P” trials), studied, respectively, eptifibatide, tirofiban and lamifiban. These trials enrolled similar patients with unstable angina or non ST-elevation AMI.^{1,2} PURSUIT and PRISM-PLUS reported 1.5% and 3% absolute reductions in the composite end point at 2–4 days that were sustained to 30 days (PURSUIT) and 6 months (PRISM-PLUS). Of interest, these studies did not show significant mortality reductions. The outcome differences reported were primarily due to differing rates of nonfatal AMI or, in PRISM-PLUS, different rates of refractory and unstable angina.

In PURSUIT, the largest of the 3, only North American (primarily US) sites showed clear benefit for patients in the IIb/IIIa study arm. Western European eptifibatide recipients experienced a small and statistically insignificant benefit, and Latin American and Eastern European eptifibatide recipients fared worse than controls. Of interest, these findings precisely paralleled regional variations in cardiac intervention rates, which were 79% in North America, 58% in Western Europe, 46% in Latin America and 20% in Eastern Europe. It is tempting to use these findings as evidence of non-benefit, but retrospective subgroup analysis is haz-

ardous and they may merely represent random variation.

On the surface, the 3-P studies appear to support the administration of IIb/IIIa inhibitors (plus ASA and heparin) to patients with unstable angina and non ST-elevation AMI; however, a close inspection of the data reveals that the greatest benefit occurred in patients who underwent percutaneous coronary intervention. It is also important to note that these studies enrolled only high-risk patients with rest pain and CK-MB elevations or objective ECG changes. There is no evidence to suggest that similar benefits would extend to lower-risk patients without objective evidence of ischemia.

The bottom line is that glycoprotein IIb/IIIa inhibitors are of benefit for patients who undergo percutaneous coronary revascularization and of less benefit for those who don't. Unfortunately, at the time of ED assessment it is not always clear who will and will not undergo PCR within 72 hours. Future studies may define a high-risk group of ED patients likely to benefit from these agents independent of PCR. As yet, it is premature to recommend their routine use in “non-interventional” patients.

References

1. The PRISM-PLUS Study Investigators. Inhibition of the platelet glycoprotein IIb/IIIa receptor with tirofiban in unstable angina and non-Q-wave myocardial infarction. *N Engl J Med* 1998;338:1488-96.
2. The PARAGON Investigators. International randomized controlled trial of lamifoban (a platelet glycoprotein IIb/IIIa inhibitor), heparin, or both in unstable angina. *Circulation* 1994;97:2386-95.

Correspondence to: michael.bullard@ualberta.ca

Helical CT in the diagnosis of pulmonary embolism

Clinical question

What is the utility of contrast-enhanced helical CT of the chest in the diagnosis of pulmonary embolism?

Article chosen

Drucker EA, Rivitis SM, Shepard JAO, Boiselle PM, Trotman-Dickenson B, Welch TJ, et al. Acute pulmonary embolism: assessment of helical CT for diagnosis. *Radiology* 1998;209:235-41.

The search

MEDLINE: 1990 to present
MeSH headings: pulmonary embolism/di [diagnosis] AND tomography, x-ray computed

Reviewer: Richard Lee, MD
University of Alberta, Edmonton, Alta.
Date studied: November 1999

Yield: 106 citations. Exclusion of reviews, editorials, comments and letters and including a hand search of the references of the remaining articles yielded 4 citations prospectively comparing helical CT to pulmonary angiography.

Clinical bottom line

Some previous studies have suggested that contrast-enhanced helical CT of the chest is a sensitive and specific test for acute pulmonary embolism (PE).^{1,2} This study by

Drucker and colleagues is consistent with a previous study³ concluding that helical CT accuracy is interpreter-dependent, that helical CT is specific but not sensitive (especially for subsegmental emboli), and that it cannot be recommended as a first-line screening test for PE.

The evidence

Design: Prospective survey.

Population: Forty-seven adult patients with suspected PE who were referred for pulmonary angiography.

Intervention: All patients underwent helical CT within 24 hours of pulmonary angiography.

Outcome measured: Helical CT interpretations from two groups of radiologists (experienced vs. inexperienced) were compared to pulmonary angiogram results. Sensitivity, specificity and accuracy were calculated using angiography as the reference standard.

Results: During the study period, 149 adult patients underwent angiography for suspected PE. Of these, 47 had helical CT. The most common reasons for exclusion were: patient unable to consent, patient or physician refused study, investigators or CT unavailable, and patient required mechanical ventilation.

Of 47 patients who underwent helical CT, 15 had angiographically proven PE and 32 did not. Radiologists who were experienced in the CT diagnosis of PE correctly identified 8 of 15 confirmed PE and correctly ruled out 31 of 32 “non-PE” cases. Radiologists who were inexperienced correctly identified 9 of 15 confirmed PE and correctly ruled out 26 of 32 “non-PE” cases. Diagnostic parameters for experienced and inexperienced radiologists are presented in Tables 1 and 2.

Comments

The high “miss rate” and poor sensitivities demonstrated in this study suggest that helical CT cannot be used to rule out acute PE. These conclusions agree with those drawn by Goodman and coworkers³ but conflict with those of Remy-Jardin and collaborators,^{1,2} who reported helical CT sensitivities of 86%–100% for PE. It is important to note, however, that in the latter studies, the higher sensitivities were only achieved by retrospectively excluding patients with subsegmental emboli.

If helical CT is from 81% to 97% specific, as reported in the Drucker study, this compares favourably with the 88% specificity of a high-probability ventilation–perfusion (V/Q) scan,⁴ making it reasonable to treat for PE based upon a positive helical CT (assuming the patient has at least intermediate pretest probability of disease). Conversely, helical CT lacks adequate sensitivity to rule out PE; therefore, patients with negative studies will often require pulmonary angiography.^{1,2}

Table 1. Helical CT interpretation of suspected pulmonary embolism by experienced radiologists

| | Pulmonary embolism | | Total |
|-------------|--------------------|--------|-------|
| | Present | Absent | |
| CT positive | 8 | 1 | 9 |
| CT negative | 7 | 31 | 38 |
| Total | 15 | 32 | 47 |

CT = computed tomography. Sensitivity = 53% (95% confidence interval [CI], 28%–78%); specificity = 97% (95% CI, 91%–100%); accuracy = 83% (95% CI, 72%–94%)

Table 2. Helical CT interpretation of suspected pulmonary embolism by inexperienced radiologists

| | Pulmonary embolism | | Total |
|-------------|--------------------|--------|-------|
| | Present | Absent | |
| CT positive | 9 | 6 | 15 |
| CT negative | 6 | 26 | 32 |
| Total | 15 | 32 | 47 |

CT = computed tomography. Sensitivity = 60% (95% confidence interval [CI], 35%–85%); specificity = 81% (95% CI, 67%–95%); accuracy = 74% (95% CI, 61%–87%)

Helical CT is non-invasive and, in many cases, may identify other causative intra-thoracic pathology; however, it requires similar contrast doses to angiography. The combined contrast load for both tests is within acceptable limits for patients with normal renal function, but patients at risk of contrast-mediated toxicity may be best served by undergoing only angiography, which remains the more definitive test.

Drucker and colleagues note that with further advances in CT scanner technology and interpreter experience, helical CT diagnostic accuracy will likely increase. Data from the European Multicenter trial (ESTIPEP), comparing V/Q scan, CT scan and angiography, are pending and will help clarify the future role of helical CT in the diagnosis of PE. Currently, however, emergency physicians should not feel reassured by a negative helical CT in a patient with suspected PE.

References

1. Remy-Jardin M, Remy J, Watinne L, Giraud F. Central pulmonary thromboembolism: diagnosis with spiral volumetric CT with the single-breath-hold technique — comparison with pulmonary angiography. *Radiology* 1992;185:381-7.
2. Remy-Jardin M, Remy J, Deschildre F, Artaud D, Beregi JP, Hossein-Foucher C. Diagnosis of pulmonary embolism with spiral CT: comparison with pulmonary angiography and scintigraphy. *Radiology* 1996;200:699-706.
3. Goodman LR, Curtin JJ, Mewissen MW, Foley WD, Lipchik RJ, Crain MR. Detection of pulmonary embolism in patients with unresolved clinical and scintigraphic diagnosis: helical CT versus angiography. *AJR* 1995;164:1369-74.
4. Stein PD, Athanasoulis C, Alawi A, Greenspan RH, Hales CA, Saltzman HA. Complications and validity of pulmonary angiography in acute pulmonary embolism. *Circulation* 1992;85:462-8.

Correspondence to: Richard.lee@ualberta.ca