SimpliRED D-dimer assay did not rule out venous thromboembolism in the emergency department

Farrell S, Hayes T, Shaw M. **A negative SimpliRED D-dimer assay result does not exclude the diagnosis of deep vein thrombosis or pulmonary embolus in emergency department patients.** Ann Emerg Med. 2000 Feb;35:121-5.

QUESTION

Can a negative test result using the SimpliRED D-dimer assay rule out venous thromboembolism (VTE) in patients who present to the emergency department with suspected deep venous thrombosis (DVT) or pulmonary embolism (PE)?

DESIGN

Blinded comparison of D-dimer assay results with the diagnostic standard of compression ultrasonography for DVT and ventilation perfusion scintigraphy and pulmonary angiography with lower-extremity ultrasonography as needed for PE.

SETTING

Emergency department of a tertiary care hospital in Portland, Maine, United States.

PATIENTS

198 consecutive patients (mean age 55 y, 59% women) were screened, and 173 were included. The inclusion criterion was being considered at high risk for VTE (DVT or PE).

DESCRIPTION OF TEST AND DIAGNOSTIC STANDARD

D-dimer assays were done on a citrated blood sample in the laboratory using the SimpliRED assay kits; any agglutination was considered to be a positive test result. Proximal DVT was diagnosed with compression ultrasonography of the common femoral, superficial femoral, or popliteal vein. PE was diagnosed using a high-probability ventilation perfusion scan, positive findings on pulmonary angiography, or positive findings on lower-extremity ultrasonography. VTE was considered to be present if a new diagnosis was made or if an unexplained death occurred within 1 month after initial nondiagnostic test results.

MAIN OUTCOME MEASURES

Sensitivity and negative likelihood ratio of D-dimer assay for VTE, DVT, and PE.

MAIN RESULTS

57 patients (33%) had VTE (16 patients had DVT, and 41 had PE). 8 patients (5%) died during follow-up. The sensitivities for VTE, DVT, and PE were not high: The SimpliRED D-dimer assay did not rule out VTE, DVT, or PE (Table). For the 26 patients who had pulmonary angiography, the sensitivity for PE using D-dimer assay results was also low (50%, 95% CI 10% to 90%).

CONCLUSION

In patients at high risk for venous thromboembolism who presented to the emergency department, the SimpliRED D-dimer assay did not rule out deep venous thrombosis or pulmonary embolism.

Source of funding: Not stated.

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Negative D-dimer assay results to rule out venous thromboembolism (deep venous thrombosis and pulmonary embolism) in high-risk patients in the emergency department*

Disorder	Sensitivity (95% CI)	–LR (CI)
Venous thromboembolism	65% (53 to 77)	0.47 (0.32 to 0.68)
Deep venous thrombosis	56% (32 to 81)	0.61 (0.34 to 1.11)
Pulmonary embolism	68% (54 to 83)	0.42 (0.26 to 0.66)

*Abbreviations defined in Glossary.

COMMENTARY

The role of D-dimer testing in clinical practice remains unclear. Of all the available D-dimer assays, the SimpliRED has been 1 of the most extensively studied. It combines simplicity of technique, rapid turnaround time, the ability to obtain bedside results, and potential cost reductions. Although several clinical trials have reported sensitivities in the range of 95% to 100%, others, including the study by Farrell and colleagues, have not confirmed these results and add to concerns about the safety of the test. Several variables may cause this lack of reproducibility across studies. Mauron and colleagues (1) found a lower sensitivity when the SimpliRED assay was done on citrated venous blood samples rather than on capillary blood (53% vs 73% to 80%, respectively) in outpatients with suspected DVT. Interobserver reproducibility of this assay has been poor (2). Finally, the predictive value of any diagnostic test relates closely to the prevalence of disease in the population studied. As shown by Farrell and colleagues and in previous studies (3, 4), the negative predictive value of the SimpliRED test is highest in patients with a low pretest probability (prevalence) of VTE. The test, however, may reduce the cost and inconvenience of serial noninvasive testing in low-risk patients and is being studied in management trials.

We believe that physicians should not use D-dimer testing to exclude VTE unless the following criteria are met. First, extensive evidence must exist to confirm high sensitivity, negative predictive value, and reproducibility for the specific assay under consideration in appropriate patients (outpatients with few or no comorbid conditions). Second, institutions considering adopting a specific assay should carefully standardize their technique and, ideally, evaluate its performance characteristics in their center. Third, the test should be incorporated into a well-validated diagnostic algorithm that is uniformly used by all clinicians who order the test.

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