Serum D-dimer is a sensitive test for the detection of acute aortic dissection: a pooled meta-analysis

Marill KA

CRD summary
This review concluded that serum D-dimer was sensitive for acute aortic dissection and potentially represented a useful test for patients who present with a low likelihood of the disease; no conclusions could be drawn regarding the specificity of the test. Given the limitations of the review and the included studies, these conclusions should be treated with caution.

Authors' objectives
To assess the sensitivity and utility of serum D-dimer as a test for acute aortic dissection.

Searching
MEDLINE, EMBASE, and Cochrane Central Register of Controlled Trials (CENTRAL) were searched for English language studies to February 2007. Search terms were reported. Bibliographies of relevant articles and reviews were also searched.

Study selection
Studies recruiting series of consecutive patients admitted to emergency and critical care units with acute aortic dissection (defined as onset of symptoms within 14 days of presentation) that measured D-dimer were eligible for inclusion. Studies where only post-surgical D-dimer was measured were excluded.

All included studies diagnosed aortic dissection using computed tomography, with transoesophageal and transthoracic echocardiography, magnetic resonance imaging, aortography and post-mortem examination also used. Where reported, symptoms were present for between one and 134 hours prior to presentation, and the proportion of included patients receiving a D-dimer test ranged from 5 to 100%. The D-dimer tests used were latex agglutination, turbidimetric, semi-quantitative latex agglutination, sandwich enzyme immunoassay, and enzyme-linked immunosorbent assay.

The author did not state how many reviewers performed the study selection.

Assessment of study quality
The author stated that study quality was guided by the STARD (Standards for Reporting of Diagnostic Accuracy) statement, MOOSE (Meta-analysis Of Observational Studies in Epidemiology) checklist and QUADAS (Quality Assessment of Diagnostic Accuracy Studies Assessment); details of the specific criteria used and the results of the quality assessment were not fully reported.

The author did not state how many reviewers performed the quality assessment.

Data extraction
Data were extracted in order to construct 2x2 tables, from which sensitivity and specificity, with 95% confidence intervals (CI) were calculated. Authors were contacted when clarification or additional data were required. A single reviewer extracted data.

Methods of synthesis
Pooled estimates of sensitivity and specificity, with 95% confidence intervals were calculated using a fixed-effect model, using a single threshold (not specified). Positive and negative likelihood ratios were calculated using the most conservative values of sensitivity and specificity. Heterogeneity was assessed using the Freeman-Halton extension of Fisher's exact test. Publication bias was investigated using a funnel plot.
Results of the review
Eleven studies met the inclusion criteria (n=604; 349 patients with a D-dimer test); these included one case series, two case-control studies, and five prospective and three retrospective cohort studies. All cases of aortic dissection were verified using a reference standard independent of the D-dimer test, but none of the studies stated that interpretation of the reference standard was blinded to the results of the D-dimer test. The funnel plots for sensitivity indicated publication bias was present.

The pooled estimate of sensitivity was 94% (95% CI 91 to 96; 11 studies). There was statistically significant heterogeneity, but this was eliminated when an outlier was excluded from the analysis. Across six studies, specificity ranged from 40% (95% CI 30 to 51) to 100% (95% CI 63 to 100). The studies were not pooled due to statistically significant heterogeneity. Using a sensitivity of 94% and specificity of 40%, the positive likelihood ratio was estimated as 1.6 and the negative likelihood ratio as 0.15.

Authors’ conclusions
Serum D-dimer was sensitive for acute aortic dissection and potentially represented a useful test for patients who present with a low likelihood of the disease; no conclusions could be drawn regarding the specificity of the test.

CRD commentary
The author addressed a clear research question with well-defined inclusion criteria. Relevant sources were searched, but only English language studies were included and there was no specific attempt to identify unpublished studies, so language and publication bias cannot be ruled out. There was no reporting of duplication at any stage of the review, so error and bias cannot be ruled out. Study quality appeared to have been assessed, but the results were poorly reported. From the details provided, the quality of the included studies was fairly poor, with several being retrospective and most having small sample sizes. Given the limitations of the review and the included studies, the conclusions of the review should be treated with caution.

Implications of the review for practice and research
The author did not state any implications for practice or further research.

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This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.