Canadian Journal of Emergency Medicine (2025) 27:176–177
https://doi.org/10.1007/s43678-024-00836-8

NEED TO KNOW: CJEM JOURNAL CLUB

Diagnostic accuracy of D-dimer for acute aortic syndromes: systematic review and meta-analysis

Kaelan Gobeil Odai[1] · **Sacha Weill**[1] · **Robert Goulden**[1,2]

Received: 5 September 2024 / Accepted: 30 October 2024 / Published online: 26 December 2024

Full link: Diagnostic Accuracy of D-Dimer for Acute Aortic Syndromes: Systematic Review and Meta-Analysis - Annals of Emergency Medicine (annemergmed.com)

Article type
Systematic Review and Meta Analysis

Rankings
Methods: 4/5
Usefulness 3/5

Introduction

Background

D-dimer has been proposed to be a sensitive marker to help "rule out" Acute Aortic Syndromes (AAS), but early studies were methodologically limited and led to an overestimation of sensitivity.

Objectives

The author's aim to update the current literature surrounding the use of D-dimer without the inclusion of case–control studies to better estimate the diagnostic accuracy of D-dimer in AAS.

Methods

Design: Systematic review and meta-analysis.

Eligibility Criteria: All cohort studies comparing non-traumatic D-dimer to a reference imaging modality (CTA, MRI, echocardiography). Case control studies were excluded.

Setting: Emergency Department.

Subjects: Anyone presenting to emergency department (ED) with symptoms suggestive of AAS. All ages included. Studies including patients with incidental findings of AAS were excluded.

Intervention: D-dimer.

Outcome: To assess the diagnostic accuracy of D-dimer for AAS.

Results

Twenty five studies were included for a total of 9228 patients who were assessed with a D-dimer and a reference imaging test in the setting of symptoms suggestive of AAS. Summary test characteristics were calculated for the 500 ng/mL threshold, showing the following: sensitivity of 95.7% (95% CI: 93.2%– 97.5%) and specificity of 57.5% (95% CI: 50.1%– 64.6%). The pooled likelihood ratio for a positive test was 2.25 (95% CI: 1.93– 2.68), and the pooled likelihood ratio for a negative result was 0.08 (95% CI: 0.04– 0.11). The 95% PrI of sensitivity of 86.1%–99.3%, with a 95% PrI of specificity of 25.3%– 83.1%. Using QUADAS-2, most studies had a low or unclear risk of bias and high applicability.

Appraisal

Strengths

- clear objectives and reason to repeat a systematic review and meta-analysis;

✉ Kaelan Gobeil Odai
dr.k.gobeilodai@outlook.com

[1] McGill University Health Centre, Montréal, QC, Canada

[2] Department of Emergency Medicine, McGill University, Montréal, QC, Canada

- methodologically sound, appraising publication bias using appropriate statistical models;
- study registered in a database;
- followed PRISMA guidelines;
- used a validated study assessment tool (QUADAS-2);
- avoids overestimation of effect by intentionally omitting case control studies;
- demonstrates encouraging results.

Limitations

- unclear patient population in which to use D-dimer (low vs moderate risk);
- studies included have varying degrees of pre-test probability for AAS ranging from 1–60%;
- difficult to implement as there is no externally validated clinical decision rule that provides pre-test probability to guide management;
- no age adjusted dimer measurement for older individuals;
- studies were compared to any reference imaging, not gold standard ECG-Gated CTA;
- most studies had poor, moderate or unclear risk of bias;
- most studies were poor in methodological rigor;
- Significant heterogeneity between study protocols included in the study.

Context

This is the most recent systematic review and meta-analysis meant to assess the use of D-dimer alone for ruling out AAS. The Canadian Practice Guidelines (CPG) by Ohle et al. [2] highlight the importance of patient selection. *"In those with a moderate risk for AAS, a normal result of D-dimer testing is reasonable to reduce probability of AAS; in patients with a low or high probability of the condition, the use of D-dimer is not recommended"*. The recent PROFUNDUS study [3] demonstrated that when used together, POCUS, D-dimer, and pre-test probability (PTP), are highly sensitive tools for selected PTP patients.

Bottom line

Through this meta-analysis and others, there is robust data to support that D-dimers are highly sensitive for AAS. However, without clear guidelines on pretest probability, its isolated use is questionable especially given its specificity remains poor. Therefore, D-dimer alone, cannot be used to diagnose or rule out AAS. Clinicians should familiarize themselves with the recent CPGs to adequately assess pre-test probability, stratify the risk of AAS, determine the pertinence of D-dimers, and the necessity for further advanced imaging techniques.

Declarations

Conflict of interest I, Kaelan Gobeil Odai declare that I have no conflicts of interest to the aforementioned manuscript I, Sacha Weill declare that I have no conflicts of interest to the aforementioned manuscript I, Robert Goulden declare that I have no conflicts of interest to the aforementioned manuscript.

References

1. Essat M, Goodacre S, Pandor A, Ren S, Ren S, Clowes M. Diagnostic accuracy of D-dimer for acute aortic syndromes: systematic review and meta-analysis. Ann Emerg Med. 2024. https://doi.org/10.1016/j.annemergmed.2024.05.001.
2. Ohle R, et al. Diagnosing acute aortic syndrome: a Canadian clinical practice guideline. Can Med Assoc J. 2020;192(29):E832–43. https://doi.org/10.1503/cmaj.200021.
3. Morello F, et al. Diagnosis of acute aortic syndromes with ultrasound and d-dimer: the PROFUNDUS study. Eur J Intern Med. 2024. https://doi.org/10.1016/j.ejim.2024.05.029.