

Reconsidering the CHA₂DS₂-VASC Score for No-Reflow Risk Stratification after Percutaneous Coronary Intervention

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Short Editorial related to the article: Association of CHA₂DS₂-VASC Score with No-Reflow Phenomenon after PCI: A Systematic Review and Meta-Analysis

The no-reflow phenomenon remains one of the most complex and clinically challenging complications of percutaneous coronary intervention (PCI).^{1,2} Although advanced imaging techniques, novel stent technologies, and contemporary pharmacological therapies are widely used today, there is still no universally accepted scoring system capable of reliably predicting no-reflow either before or during the procedure. This gap remains an important unmet clinical need.¹⁻⁴

In this context, the systematic review and meta-analysis presented by Ozbay et al. make a significant contribution to the existing literature by addressing the association between the CHA₂DS₂-VASC score and the occurrence of no-reflow after PCI.³ By synthesizing data from ten observational studies involving more than 6,500 patients, the authors demonstrated a significant and consistent association between higher CHA₂DS₂-VASC scores and an increased likelihood of no-reflow. These findings suggest that observations previously reported in single-center studies with relatively small sample sizes are confirmed in a larger population within a more robust methodological approach.⁴⁻¹¹

The potential role of the CHA₂DS₂-VASC score in predicting no-reflow is supported not only by statistical associations but also by strong pathophysiological concordance. The score incorporates components such as advanced age, hypertension, diabetes mellitus, congestive heart failure, vascular disease, prior stroke, and female sex. All of these clinical characteristics are closely linked to endothelial dysfunction, chronic inflammation, increased thrombotic tendency, and microvascular disease.^{4,12} Considering that distal embolization, microvascular obstruction, vasoconstriction, and reperfusion injury are key mechanisms involved in the pathogenesis of no-reflow, the CHA₂DS₂-VASC score may serve as a comprehensive clinical surrogate reflecting these underlying processes.² Therefore, the use of this score in the context of post-PCI no-reflow should be viewed not as an incidental extension but as a biologically meaningful repositioning.

Keywords

Percutaneous Coronary Intervention; Postoperative Complications; No-Reflow Phenomenon.

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Manuscript received January 11, 2026, revised manuscript January 28, 2026, accepted January 28, 2026

DOI: <https://doi.org/10.36660/abc.20260022>

One of the notable strengths of the meta-analysis is the overall consistency of results across different clinical subgroups. Despite a high degree of heterogeneity, the maintenance of effect direction in sensitivity analyses and multiple subgroup evaluations suggests that the observed association reflects a systematic pattern rather than a chance finding.³ Subgroup analyses limited to patients with acute ST-segment elevation myocardial infarction (STEMI) also demonstrated a persistent and significant association between the CHA₂DS₂-VASC score and no-reflow.⁵⁻⁷ Furthermore, the reduction in heterogeneity and maintenance of statistical significance after exclusion of studies reporting extreme effect sizes further support the robustness of the findings.

Although data on patients with non-ST-segment elevation myocardial infarction (NSTEMI) were more limited, the available evidence showed a trend consistent with the overall results of the meta-analysis. Studies demonstrating an association between the CHA₂DS₂-VASC score and no-reflow in NSTEMI populations require cautious interpretation because of smaller sample sizes and the observational nature of the data. These findings support the interpretation that the CHA₂DS₂-VASC score may serve as a risk marker across different clinical presentations within the acute coronary syndrome spectrum.

Nevertheless, careful interpretation of these findings is warranted. The observational nature of all included studies renders the analysis susceptible to residual and unmeasured confounding. Variables such as procedural techniques, operator experience, thrombus burden, lesion morphology, adjunctive pharmacological therapies, and strategies aimed at reducing microembolization were not uniformly reported across studies.³ In addition, variations in the definition of no-reflow and differences in statistical modeling approaches represent important sources of heterogeneity.^{3,11,13} The presence of publication bias and small-study effects also cannot be entirely excluded.

In light of these limitations, it is clear that the CHA₂DS₂-VASC score should not be regarded as an independent determinant or a decision-making tool for no-reflow. Rather, it should be considered a practical clinical indicator reflecting cumulative vascular risk burden and susceptibility to microvascular injury. In this context, the CHA₂DS₂-VASC score emerges as a tool suitable for risk enrichment rather than a diagnostic test.^{3,11}

From a clinical perspective, in patients with higher CHA₂DS₂-VASC scores, the score may serve as an early warning signal prompting more meticulous procedural planning, implementation of strategies to minimize distal embolization, and closer post-procedural monitoring.^{3,9}

Future studies should investigate whether integrating clinical scores such as CHA₂DS₂-VASC with angiographic findings, procedural variables, and inflammatory or thrombotic biomarkers can further improve the prediction of no-reflow.³ More importantly, well-designed prospective randomized studies are needed to determine whether such integrated risk models translate not only into improved predictive accuracy but also into better clinical outcomes.

In conclusion, the meta-analysis by Ozbay et al. demonstrates a significant and consistent association

between the CHA₂DS₂-VASC score and the development of no-reflow after PCI.³ This finding further underscores the close relationship between systemic vascular risk and microvascular injury and suggests that the CHA₂DS₂-VASC score may help identify patients at increased risk of no-reflow following PCI. Given the multifactorial etiology of no-reflow and its association with serious clinical outcomes, the CHA₂DS₂-VASC score may represent a useful tool for identifying high-risk patients.

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