Diagn Interv Radiol 2026; DOI: 10.4274/dir.2026.263969

INTERVENTIONAL RADIOLOGY

LETTER TO THE EDITOR

Letter to the Editor: Methodological considerations in the analysis of multiphase computed tomography angiography findings for outcome prediction in middle cerebral artery M1 occlusion

Yakup Ozbay

University of Health Sciences Türkiye, Ankara Etlik City Hospital, Clinic of Radiology, Ankara, Türkiye

Corresponding author: Yakup Ozbay

E-mail: docofrad@gmail.com

Received 01 March 2026; accepted 02 March 2026.

Epub: 07.04.2026

Publication date:

DOI: 10.4274/dir.2026.263969

Dear Editor,

I read with great interest the recent article titled "Analysis of the baseline multiphase computed tomographic angiography findings to predict clinical outcomes in patients with middle cerebral artery M1 occlusion treated with mechanical thrombectomy," published by Çıvgın and Bayındır.[1] The authors are to be commended for studying a homogeneous cohort and for focusing on imaging biomarkers that may assist early risk stratification. I would like to raise several points for clarification in the spirit of strengthening the interpretability of the findings.

First, important clinical confounders (such as age, sex, comorbidities, and National Institutes of Health stroke score) were not included in the logistic regression analysis. Age, in particular, is a well-established independent predictor of functional outcomes after mechanical thrombectomy;[2,3] even though the age difference between outcome groups did not reach statistical significance in this cohort, the approximately 6-year mean difference may still be clinically meaningful. In prognostic modeling, adjustment for known determinants (such as age and sex) is generally recommended regardless of univariate significance. Omission of these variables raises the possibility of confounding, especially if thrombus characteristics correlate with patient age or biological reserve.

Second, an interesting observation in this study is that thrombus density did not demonstrate a statistically significant difference between outcome groups ($P = 0.053$) in the group comparison, yet it emerged as an independent predictor in the logistic regression model ($P = 0.022$). Such findings are not uncommon in prognostic research and may reflect several underlying mechanisms, including collinearity among imaging variables, adjustment effects related to thrombus length, or model sensitivity associated with the relatively small sample size. In particular, when correlated predictors are entered simultaneously into a multivariable model, statistical adjustment can alter the apparent strength and direction of associations observed in the group comparison.

Third, the number of predictors entered into the logistic regression model appears relatively high given the sample size and number of outcome events. With 24 patients experiencing poor outcomes, inclusion of multiple imaging variables simultaneously may approach the limits recommended for stable multivariable modeling. Although the reported goodness-of-fit measures are reassuring, clarification of the variable selection strategy would enhance confidence in the robustness of the reported independent associations.

Finally, thrombus density was evaluated using absolute Hounsfield unit (HU) values. Because attenuation measurements may vary according to scanner characteristics and patient-specific factors such as the hematocrit, consideration of normalization (such as relative thrombus density compared with the contralateral artery or adjacent vascular structures) could potentially improve reproducibility. Future studies incorporating normalized HU metrics may further clarify the biological and prognostic relevance of thrombus composition.

You may cite this article as: Ozbay Y. Letter to the Editor: methodological considerations in the analysis of multiphase computed tomography angiography findings for outcome prediction in middle cerebral artery M1 occlusion. *Diagn Interv Radiol*. 07 April 2026 DOI: 10.4274/dir.2026.263969 [Epub Ahead of Print].

Overall, this study contributes valuable data on the potential prognostic role of thrombus length and density in a carefully selected population. Addressing the points above would further strengthen the conclusions and facilitate broader clinical applicability.

Footnotes

Conflict of interest disclosure

The author declared no conflicts of interest.

References

1. Çıvgın E, Bayındır H. Analysis of the baseline multiphase computed tomographic angiography findings to predict clinical outcomes in patients with middle cerebral artery M1 occlusion treated with mechanical thrombectomy. *Diagn Interv Radiol*. 2025. [Crossref]
2. Rhiner N, Thut MZ, Thurner P, et al. Impact of age on mechanical thrombectomy and clinical outcome in patients with acute ischemic stroke. *J Stroke Cerebrovasc Dis*. 2023;32(9):107248. [Crossref]
3. Forti P, Maioli F, Procaccianti G, et al. Independent predictors of ischemic stroke in the elderly: prospective data from a stroke unit. *Neurology*. 2013;80(1):29-38. Erratum in: *Neurology*. 2013;81(21):1882. [Crossref]