



Letter to the Editor

The outcome of a subdural hematoma after embolization of the middle meningeal artery depends on many influencing factors

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Dear Editor,

We read with interest the article by Imai *et al.* on a single-center retrospective study of the outcome of 72 patients after the first recurrence of chronic subdural hematoma (SDH).^[2] Initial treatment included burr-hole evacuation or drainage in all 72 patients.^[2] Seventeen patients underwent middle meningeal artery embolization (MMAE) of the proximal and distal branches.^[2] The median time from initial surgical therapy to MMAE was 24.9 days.^[2] Six of the 17 patients (35.3%) had a recurrence after embolization that required surgical treatment.^[2] Twenty-seven of the 72 patients experienced a second recurrence of SDH.^[2] The interval between the first and second SDH was shorter in cases with a second recurrence than in cured cases.^[2] It was concluded that SDH patients with a short first recurrence interval were more likely to have a second recurrence, that repeated recurrences within a short period increased the likelihood of post-embolic recurrence, and that early MMAE after the first surgical treatment increased the risk of recurrence.^[2] The study is excellent, but some points should be discussed.

The first point is that the number of patients included in the study was too small to conclude, as reported. Prospective, multicenter, and large-scale studies are needed to determine the optimal timing of MMAE for embolization after the first recurrence of SDH.

The second point is that SDH can originate not only from branches of the middle meningeal artery (MMA) but also from branches of the anterior or posterior meningeal artery. Therefore, MMAE may not be effective if it has not been clearly established before embolization whether the hemorrhage actually originates from an MMA branch. Were all 17 patients who underwent MMAE also searched for the source of bleeding?

The third point is that the study period included the time of the pandemic. Therefore, we should know how many of the 72 included patients were severe-acute-respiratory-syndrome-related coronavirus-2 (SARS-CoV-2) positive at the time of SDH recurrence. Knowing the number of infected individuals is crucial because SARS-CoV-2 infections can be complicated by SDH^[4] and because the outcome of SDH, whether embolized or not, may strongly depend on the presence or absence of SARS-CoV-2 infection^[1] and whether the infection was mild, moderate, or severe. The fourth point is that counting SDH recurrences can be difficult because not every recurrence of SDH is associated with clinical manifestations.^[3] Even when patients experience SDH complicated by midline shift, these patients may have minimal or even asymptomatic symptoms.

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One limitation of the study is that hereditary coagulopathies were not sufficiently excluded as a cause of SDH. Another limitation is that the follow-up period was short, and since the recurrence rate depends on the duration of follow-up, especially in the patients classified as cured, we should know how many of the patients classified as cured had a recurrence of SDH at 6 or 12 months follow-up.

To summarize, this interesting study has limitations that put the results and their interpretation into perspective. Addressing these limitations could strengthen the conclusions and corroborate the study's message. Multicenter studies with large cohorts are needed before the optimal timing for embolization of MMA in patients with recurrent SDH can be determined. Since one-third of the patients who underwent embolization relapsed,^[1] it should be discussed whether embolization is really an appropriate treatment for chronic SDH.

Use of Artificial Intelligence (AI)-Assisted Technology for manuscript preparation

The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the

writing or editing of the manuscript and no images were manipulated using AI.

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