Correspondence

Response to correspondence concerning "Association between kidney function and intracerebral hematoma volume"

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Dear Editor,

We thank Suresh et al. for their comments [1] on our study [2]. Our analysis showed no significant relationship between renal function and intracerebral hematoma volume besides an increasing tendency of the hematomas with malnutrition and the use of antithrombotic agents. Suresh et al. pointed out that our research did not consider electrolyte abnormalities in the analysis.

Recent studies have reported the association between the electrolyte abnormalities at presentation and the hematoma expansion after admission in intracerebral hemorrhage [3–5]. On the other hand, our study analyzed the relationship of the renal function and the hematoma volume at presentation with consideration of potential confounders. Although the outcome variables were actually different between the previous studies and our study, there is a clinical concern about an association between the electrolyte abnormalities and the size of the hematoma volume at presentation. We, therefore, extracted the levels of electrolytes (potassium, calcium, and magnesium) from the database and considered them as additional covariates in the multivariable analyses.

As a result, the median and interquartile range of electrolytes as follows: potassium, 139 (137–141) mEq/L; calcium, 8.7 (8.4–9.1) mg/dL; and magnesium, 2.1 (1.9–2.2) mg/dL. The relationships of the hematoma volume to the renal dysfunction and the nutritional status were shown in Figure 1, which were estimated via the multivariable non-linear regression models. Furthermore, the outcome-adaptive double/debiased machine learning estimation revealed that the patients who were used the antithrombotic agents had 25.4 ml more the hematoma volume than those without the antithrombotic agents (estimated amount of increase [95% confidence interval] = 25.40 [-6.73 – 57.53]). These results were not significantly different from those without considering the electrolyte abnormalities.

The strength of our study was that we considered many potential confounders in the analysis, and we are confident about the results. However, as outlined above, the dependent variable of our study was not hematoma expansion after admission but hematoma volume at presentation, so there is still room for debate on the issue. Further studies are needed to determine whether electrolyte abnormalities correlate with hematoma volume at admission.

Declaration of Competing Interest

None.

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Figure captions

Figure 1. The relationships of hematoma volumes to renal functions and nutritiona status. The ordinate shows the hematoma volume. The horizontal bar represents the estimated glomerular filtration ratio (eGFR) and Controlling Nutritional Status (CONUT) score. We assessed the non-linear associations between the hematoma volumes and the renal functions and the nutritional status via the multivariable non-linear regression analyses considering the electrolytes, potassium, calcium, and magnesium as the covariates. The shaded area illustrated 95% confidence intervals. A) eGFR and hematoma volume had a positive linear association, albeit not significantly (P = 0.177), and B) CONUT and hematoma volume were positively associated, albeit not significantly (P = 0.222).