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Methodological issues on prediction of clinical outcomes in patients with aneurysmal subarachnoid hemorrhage using computed tomography

Dear Editor,

We read with great interest the study by Kanazawa T and colleagues in the Sep 2019 issue of J Clin Neurosci [1]. Detection of computed tomography (CT) texture parameters to predict cerebral vasospasm, delayed cerebral ischemia (DCI), and functional outcome in aneurysmal SAH using quantitative CT texture analysis (CTTA) was purpose this study [1]. Clinical, demographic, and imaging data from 40 patients with SAH treated were retrospectively reviewed for this purpose. Univariate analysis and receiver operating characteristic (ROC) analysis were performed in the study. Also, the sensitivity, specificity, positive predictive value and negative predictive value of statistically significant imaging parameters were calculated for each clinical outcome. Based on the results of the authors, The mean CT value ≥ 49.64 , 49.95 and 53.00 Hounsfield units (HU) predicted cerebral vasospasm, DCI and poor functional outcome with a sensitivity, specificity and AUC (85.7%, 61.5% and 0.758), (100%, 60.6% and 0.810) and (56.3%, 91.7% and 0.747) respectively [1].

We want to explain some methodological issues regarding this study. First of all, to develop and validate a prediction model, it is strongly recommended to use two different groups or at least one cohort for division (the group is composed with both failures and the success of the result) and if the model is not validated, the results of the study are not sufficiently generalized [2–6]. Different methods are usually applying for validation of a prediction model such as the split file, Jackknife and bootstrap by multiple sampling, or other well-known validation methods. Second, Interactions between important variables should be evaluated, especially when there are qualitative interactions, the final results will be significantly affected [2]. Another problem is that AUC and (sensitivity, specificity, positive predictive value, negative predictive value) are among the estimates to assess validity (accuracy) of a diagnostic model and test respectively and the statistical significance of each of these, do not guarantee prediction [4].

Authors concluded that CTTA using a commercially available software program demonstrated that the mean CT value of clots in the subarachnoid space in the early postictal state could predict vasospasm, DCI, and clinical outcome with a high sensitivity and specificity [1]. Briefly, in prediction studies, the main purpose is to provide a model, index, or score applicable to an individual

(patient). Finally, associations, even those that are statistically significant, do not guarantee prediction [3,4].

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jocn.2020.01.011>.

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