Spontaneous intracerebral hemorrhage expansion prediction

Signs

Black hole sign.

Blend sign,

Spot sign.

NAG scale

A fluid level within intraparenchymal hemorrhage on head CT scan is associated with higher likelihood of intracerebral hemorrhage progression. However, this only applies to true fluid levels, with mimics having a lower likelihood of progression. A careful analysis of potential fluid levels is necessary before assigning prognostic implications [1].

A study of Lim et al. aimed to externally validate three risk prediction models of HE (PREDICT score, 9-point, and BRAIN scores) in an Asian population.

A prospective cohort of 123 spontaneous ICH patients admitted to a tertiary hospital (certified stroke center) in Singapore was recruited. Logistic recalibrations were performed to obtain updated calibration slopes and intercepts for all models. The discrimination (c-statistic), calibration (Hosmer-Lemeshow test, le Cessie-van Houwelingen-Copas-Hosmer test, Akaike information criterion), overall performance (Brier score, R2), and clinical usefulness (decision curve analysis) of the risk prediction models were examined.

Overall, the recalibrated PREDICT performed best among the three models in our study cohort based on the novel matrix comprising of Akaike information criterion and c-statistic. The PREDICT model had the highest R2 (0.26) and lowest Brier score (0.14). Decision curve analyses showed that recalibrated PREDICT was more clinically useful than 9-point and BRAIN models over the greatest range of threshold probabilities. The two scores (PREDICT and 9-point) which incorporated computed tomography (CT) angiography spot sign outperformed the one without (BRAIN).

This is the first study to validate HE scores, namely PREDICT, 9-Point and BRAIN, in a multi-ethnic Asian ICH patient population. The PREDICT score was the best performing model in our study cohort, based on the performance metrics employed in this study. Our findings also showed support for CT angiography spot sign as a predictor of outcome after ICH. Although the models assessed are sufficient for risk stratification, the discrimination and calibration are at best moderate and could be improved [2].

[1]

Ratnayake C, Okonkwo D, Branstetter B. Hematoma Progression Rates on Head CT for Fluid Levels Versus Mimics in Patients with Primary Intracerebral Hemorrhage. World Neurosurg. 2022 Nov 2:S1878-8750(22)01528-5. doi: 10.1016/j.wneu.2022.10.112. Epub ahead of print. PMID: 36334718.

[2]

Lim JX, Han JX, See AAQ, Lew VH, Chock WT, Ban VF, Pothiawala S, Lim WEH, McAdory LE, James ML, King NKK. External Validation of Hematoma Expansion Scores in Spontaneous Intracerebral Hemorrhage in an Asian Patient Cohort. Neurocrit Care. 2018 Oct 30. doi: 10.1007/s12028-018-0631-8. [Epub ahead of print] PubMed PMID: 30377910.

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