

Hematoma Hounsfield units for predicting expansion of intracerebral hemorrhage: a potential marker of hemostatic clot contraction

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Objective Clot contraction is necessary for hemostasis by providing impermeable barrier and force. Since computed tomography (CT) attenuation of intracerebral hemorrhage is largely determined by the density of red blood cells, clot contraction may be reflected in an increase of Hounsfield unit (HU) of hematoma. Thus, we hypothesized hematoma expansion is more likely to occur in intracerebral hemorrhage with lower mean HU. Methods A total of 89 spontaneous intracerebral hemorrhage patients with onset to first CT within 24 hours were analyzed. Hematoma were segmented using semiautomated planimetry to measure volume and mean HU of the hematoma. Hematoma expansion was defined as an increase of hematoma volume over 33% or 6 mL. Multivariable logistic regression was performed for hematoma expansion. The discrimination power of mean HU was assessed using C statistic. Results Mean HU of hematoma at initial CT scan was 57.5 ± 3.3 HU and the volume was 16.9 ± 23.2 mL. Hematoma expansion occurred in 37.1% of patients. Mean HU of hematoma was lower in patients with hematoma expansion than no expansion (55.7 ± 2.9 HU vs. 58.6 ± 3.1 HU, p -value 0.01). Multivariable logistic regression revealed mean HU (per 1-HU increase) was inversely associated with hematoma expansion (adjusted odds ratio, 0.67; 95% confidence interval, 0.51–0.89). The C statistic of predictive model increased from 0.66 to 0.84 after adding mean HU (p -value 0.01). Conclusion Intracerebral hemorrhage with lower mean HU of hematoma at presentation is more prone to experience hematoma expansion. This finding indicates the importance of clot contraction to reinforce hemostasis in intracerebral hemorrhage.