

A Comparison of ABC/2 Formula with a Semiautomated Software-Based Hematoma Volume Measurement Technique in Intracranial Haemorrhage

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Intracranial haemorrhage has been reported as a cause of all kinds of strokes while causing high mortality and disability for a longer duration and the accuracy of volumetric measurement of the hematoma has a considerable impact on the correct diagnosis and choice of treatments. This study aimed to compare a manual method and a software-based method to measure hematoma volume while evaluating changes in the mean HU value of the hematoma and the impact of the time interval between the two consecutive scans on hematoma volume using non-contrast computed tomography (NCCT) head images. The volumetric measurement of each hematoma was carried out separately using a manual method and a software-based (SB) method in 61 NCCT head images. For the manual method, TADA formula was used to estimate the hematoma volume with length, width and depth measured on NCCT axial and sagittal brain images. 3D slicer (Slicer 4.10.2) software was used for the software-based volume analysis and to measure the HU value of the hematoma. Two volume measurement methods demonstrated a significant difference between their measurements ($p < 0.05$) with a significant strong positive correlation with each ($r = 0.977$). Furthermore, hematoma volume difference and time interval between scans revealed a moderate positive correlation ($r = 0.517$) and the haemoglobin level at admission demonstrated mild positive correlations with hematoma volumes ($r = 0.274$) both of which are statistically significant. Significant mild positive correlations were found between mean HU value and the two hematoma volumes ($r = 0.307$, $r = 0.263$) respectively, whilst the mean HU difference demonstrated a moderate positive correlation with hematoma volume difference. The TADA approach demonstrated a significant difference in volume measurements when compared to a software-based method, therefore more research is needed to support the implementation of an internally designed automatic volumetric measuring method to improve accuracy and efficacy.

Keywords: ICH, CT, hematoma volume, volumetric measurement, HU value