Delta NIHSS after Alteplase for Acute Ischemic Stroke

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Title: Delta National Institute of Health Stroke Scale after Alteplase for Acute Ischemic Stroke

Objective: To quantify the improvement or worsening of stroke severity as measured by the National Institutes of Health Stroke Scale (NIHSS) after the administration of alteplase.

Methods: This study is an Institutional Review Board approved prospective observational study of consecutive acute ischemic stroke patients presenting to the emergency department of a comprehensive stroke center from January 1, 2020 to December 31, 2021. The delta NIHSS was classified as the NIHSS at hospital discharge minus the NIHSS calculated upon initial ED presentation. Door to needle time (DTN) was calculated as the time of ED presentation to administration of alteplase. Additional variables collected included age, sex, race, whether the stroke eventually was categorized as a mimic, the occurrence of post-alteplase bleed, and whether the patient underwent thrombectomy.

Results: The cohort of 259 was 50% female. The racial composition was 43% white, 40% Hispanic, 12% black, 5% Asian, and 1% unknown. The median DTN was 37 minutes, interquartile range (IQR) 29 to 52, and a range of 14 to 187 minutes. The median initial NIHSS was 9, IQR 5-16, with a range from 0 to 40. The median post-alteplase NIHSS was 2, IQR 0-5. The NIHSS worsened in 13 (5%) patients. Seven patients (3%) had a post-tissue plasminogen activator (tPA) bleed. Ten percent (n=26) eventually coded out as a stroke mimic. Twelve percent underwent thrombectomy, and had a significantly larger and improved delta NIHSS (11 vs. 5, t-test, $P<0.0001$). Older patients also had a larger delta NIHSS ($P=0.0275$), but this was mostly in the negative direction and due to the older age of patients who suffered a post-alteplase bleed (median age 82 vs. 65 years). A multivariate model that included age, sex, race, whether a stroke mimic, and occurrence of post-alteplase bleed, or thrombectomy demonstrated that these same univariate correlates retained statistical significance. The linear regression model was robust with a goodness of fit (R^2) of 14%.

Conclusion:
In this cohort of acute ischemic stroke patients who received alteplase, 95% had improved NIHSS scores at hospital discharge. Patients eligible for thrombectomy had significantly higher improvement in their NIHSS scores.