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**Title:**

Comparison of Tenecteplase vs. Alteplase Door-To-Needle Time in Acute Ischemic Stroke

**Authors:**

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**Purpose:**

Alteplase is a recombinant form of human tissue plasminogen activator. It has a short half-life of about 5 minutes and requires continuous infusion or repeated boluses to maintain therapeutic levels. Tenecteplase is a genetically modified version of alteplase and has a longer half-life of about 20 minutes, which allows for a single bolus injection. The benefits of thrombolytic therapy in stroke patients are time-dependent, with the American Heart Association guideline recommended door-to-needle time being 60 minutes or less. The role of tenecteplase has been recently debated for use in acute ischemic stroke in place of alteplase. The objective of this study is to evaluate door-to-needle time in patients diagnosed with acute ischemic stroke who received alteplase compared to those who received tenecteplase.

**Methods:**

This study will be submitted to the Institutional Review Board for approval. This is a single center retrospective evaluative study of patients that received intravenous thrombolytic therapy with alteplase or tenecteplase for acute ischemic stroke at Waterbury Hospital. The population that will be studied includes patients aged 18 and older who were treated with either alteplase or tenecteplase for acute ischemic stroke from the time frame of January 1, 2018 through March 31, 2023. Patients excluded from this study are those diagnosed with acute ischemic stroke who did not meet the criteria for thrombolytic therapy or patients who developed stroke symptoms after admission. The following data points for each patient will be evaluated: patient age, sex, ethnicity, stroke alert timing, order entry time and medication administration time. Records of patients that received alteplase will be compared to records of patients that received tenecteplase. The primary outcome, door-to-needle time, will be analyzed between groups. Secondary outcomes will assess order entry processing time to thrombolytic administration, achievement of a door-to-needle time within 60 minutes in 75% or more of acute ischemic stroke patients treated with intravenous thrombolytics, and achievement of a door-to-needle time within 45 minutes in 50% or more of acute ischemic stroke patients treated with intravenous thrombolytics. Using an alpha level of 0.05, analysis will comprise descriptive statistics as well as the student’s t-test and chi-squared test.

**Results:**

There were 124 patients included in this study: 99 (79.8%) in the alteplase group and 25 (20.2%) in the tenecteplase group. There was a significant difference found in door-to-needle time between alteplase and tenecteplase (83.2 minutes vs 70.1 minutes respectively, P = 0.03). There was also a significant difference in the order entry processing time to thrombolytic administration between the alteplase and tenecteplase groups (22.5 minutes vs 16.7 minutes respectively, P = 0.01). There was no significant difference between the alteplase and tenecteplase groups in patients who received thrombolytic therapy within 60 minutes (38% and 48% respectively, P = 0.38). Similarly, there was no significant difference between the alteplase and tenecteplase groups in patients who received thrombolytic therapy within 45 minutes (21% and 16% respectively, P = 0.34).

**Conclusion:**

Tenecteplase was associated with faster door-to-needle time in comparison to alteplase in patients with acute ischemic stroke. Tenecteplase was also associated with faster order processing times in comparison to alteplase. However, despite these improvements in door-to-needle time and order processing, there were no significant improvements in the percentage of patients who received thrombolytic therapy within 60 minutes or 45 minutes between the two groups. Therefore, in terms of the time to thrombolytic therapy administration, there does not appear to be a significant difference between the two groups. There may still be a potential clinical benefit that can be observed in patients who receive tenecteplase instead of alteplase as a result of faster door-to-needle time, improving patient outcomes by meeting the American Heart Association’s recommended door-to-needle time of less than 60 minutes. This data shows preliminary success at reducing door-to-needle time through pharmaceutical changes. Further studies would have to be conducted to assess further stroke protocol optimization and assess the clinical impact of switching to tenecteplase.