Tenecteplase for Intravenous Thrombolysis of Ischemic Stroke: A Single MRI-based Comprehensive Stroke Center Experience

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Abstract

Background: Tenecteplase is a tissue plasminogen activator with higher fibrin specificity compared with Alteplase. Accumulating data suggests that intravenous Tenecteplase 0.25mg/kg is non-inferior to Alteplase 0.9mg/kg for acute ischemic stroke. We describe our 10-months experience.

Methods: At our MRI-based, urban comprehensive stroke center, we switched the intravenous thrombolytic agent for acute ischemic stroke to Tenecteplase 0.25mg/kg on March 23, 2021. Until January 31, 2022, 62 stroke patients were treated with Tenecteplase. We compared clinical and safety outcomes of Tenecteplase-treated patients with 94 Alteplase-treated patients.

Results: During the study period, nine (15%) patients with unknown stroke onset were thrombolyzed with MRI screening. Nineteen (35%) patients underwent subsequent thrombectomy. When compared with Alteplase-treated patients, there was no difference with Tenecteplase-treated patients in 90-day functional outcome, death, symptomatic intracranial hemorrhage, or angioedema.

Conclusions: The use of Tenecteplase for stroke thrombolysis was feasible with comparable safety and functional outcomes compared to Alteplase, even when Tenecteplase was administered based on MRI screening to stroke patients with unknown onset.

Background

Accumulating data suggests that intravenous (IV) Tenecteplase is non-inferior to Alteplase for acute ischemic stroke (AIS) [1]. Tenecteplase is administered as a single 5-second intravenous bolus, and thus simplifies the stroke thrombolysis workflow [2]. At our MRI-based, urban comprehensive stroke center, we switched the IV thrombolytic agent for AIS to Tenecteplase 0.25mg/kg on March 23, 2021. We describe our experience.

Methods

We identified AIS patients treated with IV thrombolysis at MedStar Washington Hospital Center, DC, USA from January 1, 2020 to January 31, 2022. Tenecteplase-treated patients (March 23, 2021 to January 31, 2022) were compared with Alteplase-treated patients (January 1, 2020 to March 22, 2021) for Quality Assurance (QA) purposes. Patients transferred from outside hospitals after IV thrombolysis administration were excluded. Clinical outcome measures included 90-day modified Rankin Scale (mRS) 0–1 or equal to pre-stroke mRS, death by 90-days, symptomatic intracranial hemorrhage, and angioedema. The local Institutional Review Board determined that no committee review was required for this QA initiative. Statistical analysis was performed with IBM SPSS software version 1.0.0.1406. The data that support this study result is available upon reasonable request to the corresponding author.

Results

A total of 156 patients were treated during the QA period: 94 Alteplase-treated and 62 Tenecteplase-treated. Baseline characteristics, stroke time metrics, and outcomes are shown in the Table. Seventy-six percent of patients were African American. Seventy-eight percent were MRI-screened and 13% were treated after 4.5h from last-known-well guided by MRI findings [3]. There was no difference in characteristics between the Tenecteplase and Alteplase groups. After adjusting for potential confounding factors using a multivariable logistic regression model, there was no significant difference in outcomes between the two groups.

Discussion

The use of Tenecteplase for AIS thrombolysis at an MRI-based, urban U.S. comprehensive stroke center was feasible with comparable safety and functional outcomes compared to Alteplase. Despite 13% of unwitnessed onset AIS patients and a higher proportion of the African American population, our experience is consistent with two prior real-world data reports [4, 5] and a meta-analysis of 5 trials with regard to safety and outcomes [1]. Our data add to the accumulating evidence and generalizability in support of the use of Tenecteplase for AIS IV thrombolysis, including in unwitnessed onset patients screened with MRI.

Our study limitations include 9 patients in the Tenecteplase group for whom the 30-day mRS was used in lieu of 90-day, which had not been reached at the time of data analysis. Seven Tenecteplase patients and 1 Alteplase patient have missing final mRS. Retrospective pre- and post-Tenecteplase comparisons can be confounded by unblinded outcome measurements.

Conclusions

The use of Tenecteplase for stroke thrombolysis was feasible with comparable safety and functional outcomes compared to Alteplase, even when Tenecteplase was administered based on MRI screening to stroke patients with unknown onset.

Abbreviations

AIS, Acute ischemic stroke; IV, Intravenous; MRI, Magnetic resonance imaging; mRS, modified Rankin Scale; QA, quality assurance

Declarations

Ethics approval and consent to participate: The MedStar Human Research Institute's Institutional Review Board determined that no committee review was required for this QA initiative.

Consent of publication: Not applicable

Availability of data and materials: The datasets used and analyzed during the current study are available from the corresponding author on reasonable request.

Competing interest: none

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Author's contributions: YK and PU designed the study, collected and analyzed data, and wrote the manuscript. KM, SB, VAC, KK, and SS collected data collection and scientifically edit and revise the manuscript. AWH supervised the study, design the study, and scientifically edit the manuscript.

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Table

Table. Comparison of Baseline Characteristics and Outcomes

	Tenecteplase (n=62)	Alteplase (n=94)	P value (OR)
Age, median (IQR), years	70 (63 – 79)	70 (58 – 81)	0.558
Female, n (%)	34 (55)	49 (52)	0.746
African American, n (%)	49 (79)	69 (73)	0.519
Baseline NIHSS, median (IQR)	9 (5 – 15)	7 (4 – 16)	0.280
Pre-stroke mRS, median (IQR)	0 (0 – 1)	0 (0 – 1)	0.969
Endovascular Thrombectomy, n (%)	19 (31)	24 (26)	0.583
Screened with MRI, n (%)	48 (77)	73 (78)	0.972
Extended-window Thrombolysis, n (%)	9 (15)	11 (12)	0.631
Door-to-Needle time, median (IQR), minutes	60 (49 – 74)	65 (54 – 76)	0.189
Needle-to-Groin time, median (IQR), minutes	48 (37 – 72)	60 (36 – 100)	0.298
90-day mRS 0-1 or equal to pre-stroke, n (%)	41 (66)	52 (55)	0.078 (OR 1.97, 95% CI 0.93 – 4.18)
Death by 90-days, n (%)	3 (5)	10 (11)	0.142 (OR 0.34, 95% CI 0.08 – 1.44)
Symptomatic ICH, n (%)	1 (2)	4 (4)	0.287 (OR 0.28, 95% CI 0.03 – 2.90)
Angioedema, n (%)	3 (5)	3 (3)	0.632 (OR 1.52, 95% CI 0.27 – 8.51)

IQR, interquartile range; OR, odds ratio; NIHSS, National Institutes of Health Stroke Scale; mRS, modified Rankin Scale; ICH, intracranial hemorrhage