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FACULTÉ DE MÉDECINE ET DE PHARMACIE

TENECTEPLASE VERSUS ALTEPLASE FOR THE MANAGEMENT OF ACUTE ISCHAEMIC STROKE

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Option: Neurology

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A great emotion and a deep respect for you. Today, we have the honor to write this modest word in order to return homage to our teachers who guided us and always made efforts to our learning and training in both practice and theory formation. These few lines are not enough to express, dear teachers, my great recognition and my deep gratitude for your human and professional qualities which will certainly serve as an example in my career. We remain forever grateful and sincerely respectful to you

SUMMARY

ABSTRACT

Background

Intravenous thrombolysis in ischemic stroke was started at university hospital center (CHU) Hassan II Fez in 2010. Alteplase was the thrombolytic agent used from the beginning. In February 2017, and given the non-availability of alteplase, tenecteplase was been used as a thrombolytic agent for our patients.

Objective

The objective of this study is to compare the clinical, radiological evolution of patients who had been thrombolysed by tenecteplase compared to 30 patients thrombolysed by Alteplase

Methods

This is a clinical study with retrospective recruitment involving a series of 60 patients over 18 years old, thrombolysed in the Department of Neurology CHU Hassan II Fez. The first group consists the first 30 patients thrombolysed by Tenecteplase at a dose of 0.25 mg/kg given in intravenous bolus in one minute. The second group of 30 patients thrombolysed by Alteplase at 0.9 mg/kg (10% of the dose in 1 minute and 90% of the dose in 1 hour), selected in the database of thrombolysed patients matched according to the admission NIHSS scale and age, NIHSS scale after 2 hours and 24 hours of thrombolysis, drugadministration delay as well as ASPECTS, Rankin scales and hemorrhagic transformation were compared between the two groups. All the patients hadbeen included in the SITS (Safe of Implementation of Treatment in Stroke) register.

Results

The mean age was 66 years for the Tenecteplase group with a slight feminine predominance 53% and 68 years for the Alteplase group (43% women). For the Tenecteplase group, the mean NIHSS scale was improved after thrombolysis in the both groups: from 14 on admission, to 10 after 2h and 8 after 24h for the Tenecteplase group, and 14 on admission, 10 after 2h and 9 after 24 hours for the Alteplase group. The Rankin mean after 7 days was 3 for the two groups, while the Rankin at 3 months was 2 for the first group and 2,5 for the second group. Five patients thrombolysed by Tenecteplase had hemorrhagic transformation compared to seven patients thrombolysed by Alteplase. Hemorrhagic transformation was the reason of death for 4 patients (2 thrombolysed by Alteplase and 2 by Tenecteplase).

Conclusion

Tenecteplase appears to be equally effective in IV Thrombolysis compared to Alteplase. A larger study is needed to confirm our results.

Key words: Ischemic stroke – Tenecteplase – Alteplase – Thrombolysis

INTRODUCTION

Stroke is a leading cause of death and disability worldwide. Moststrokes are ischaemic and due to a thrombotic or embolic occlusion of an intracranial artery. Rapid administration of intravenous thrombolytic therapy with the drug recombinant tissue plasminogen activator (rt-PA, generic name alteplase) was the principal treatment in the early hours after the onset of symptoms [1]. Alteplase was the only agent used for this purpose [2].However, some studies have shown the superiority of Tenecteplase [3-4], its ease of handling and the time of its action to better take advantage of the short window therapy. Even in myocardial infarction, it has shown a better thrombolytic profil and potency compared with Alteplase[5].Tenecteplase is a modified tissue plasminogen activator that is more fibrin-specific, more resistant to plasminogen activator inhibitor (PAI), has a longer half-lifethan Alteplase and can be administered as a simple intravenous bolus [6, 7].

Tenecteplase is a newer thrombolytic agent which have some pharmacological advantages compared to Alteplase [8]. So, In February 2017, and given the non-availability of Alteplase in our department of neurology, Tenecteplase has been used as a thrombolytic agent for our patients.

The aim of this study is to compare efficacy and safety of tenecteplase0.25 mg/kg (single bolus) versus the alteplase 0.9 mg/kg (10%bolus + 90% infusion/60 minutes) given in less than 4.5 hoursafter symptoms onset.

MATERIALS AND METHODS

1. Type of clinical study

This is aquasi-experimentalclinical study with retrospective recruitment involving a series of 60 patients who were treated by Tenecteplase or Alteplase for anacute ischemic stroke admitted to the emergency department of Neurology CHU Hassan II Fez in less than 4½ hours, had been hospitalized at the neurovascular unitand had all criteria for thrombolysis. The neurological resident have been also trained to the assessment of neurological status by calculating the NIHSS score. This score counts 15 items that measure the depth of the neurological deficit quoted from 0 to 42, <5 it reflects a minor deficit and > 25 severe neurological impairment. In collaboration with the medical imaging department, CT scan was obtained as early as possible in the emergency department, and was evaluated by neurologist and radiologist.

2. Patient selection criteria

2.1. Inclusion criteria

All patients found eligible for routine thrombolytic therapywere eligible for our study. Inclusion criteria for thrombolytic therapy are defined as follows:

- Age 18 years or older.
- Focal neurological deficit caused by ischemic stroke
- MRI or CT-scan done within 4½ hours of stroke onset.
- Treatment within 4½ hours of stroke onset.
- Informed written or verbal consent signed by the patient ora member of his family that must be provided before treatment.

2.2. Exclusioncriteria

Exclusion criteria for thrombolytic therapy are defined as follows:

- Patients with premorbid modified Rankin Scale(mRS) ≥2.
- Patients with NIHSS score at 0 inadmission
- ASPECTS scale <7
- Intracranial hemorrhage on baseline CT.
- Patients with systolic blood pressure >180 mm Hg or diastolic blood pressure >110 mm Hg despite of blood pressure lowering therapy.
- Pregnant or breast feeding.
- known bleeding diathesis; use of oral anticoagulants and INR ≥1.7; heparin <48, new oral anticoagulants <12 hours
- Sepsis, endocarditis, pericarditis
- Patients with arterial puncture at a no compressible
- Site or lumbar puncture <7 days
- Major surgery or serious trauma <14 days
- Gastrointestinal or urinary tract hemorrhage <14 days
- Recent myocardial infarction <21 days
- Clinical stroke <3 months
- History of intracranial hemorrhage
- Serious head trauma <2 months

It was also excluded from this study all situations of stroke mimics (hysterical conversions, tumor, hypoglycemia, post epileptic seizuredeficit...)

3. Comparative study assessment criteria

For each patient thrombolysed, we collected the following information: age, sex, day, and month of neurological deficit; NIHSS score before and after thrombolysis (2 hours and 24 hours), ASPECTS score, Delay of the drug administration, Rankin scale after 7 days and 3 months.

The 2 groups (Group1 tenecteplase and group 2 alteplase) were selected in the database of thrombolysed patients matched according to the admission NIHSS scale and age. All the patients hadbeen included in an international registry as part of Middle East and North African countries study: SITS MENA (Safe of Implementation of Treatment in Stroke in Middle East and North Africa).

4. Statically Analysis

In the descriptive analysis of the data, patient characteristics were expressed as percentages for the qualitative variables and mean ± standard deviation for the quantitative variables. Baseline characteristics were compared using Student t, $\chi 2$, and Mann–Whitney U tests, where appropriate. P values <0.05 were considered statistically significant. All statistical analyses were performed withSPSS software version 20 (SPSS Inc., Armonk, New York).

RESULTS

Table 1: Demographic, clinical, and stroke characteristics

Characteristics	Mean and Intervals	Tenecteplase (n=30)	Alteplase (n=30)	Signification (p)
Age	Mean	67.3	68.08	NS (p=1)
	≤ 65	14(47%)	10(33.3%)	
	>65	16(53%)	20(66.7%)	
Sex	Women	16(53%)	13(43%)	NS (p=0.793)
	Men	14(47%)	17(57%)	
Day of admission	weekend	6(20%)	10(33.3%)	NS (p=0.243)
	No weekend	24(80%)	20(66.7%)	
Time of admission	Morning	17(57%)	16(53%)	NS (p=0.5)
	Evening	8(26%)	11(37%)	
	Night	5(17%)	3(10%)	
ASPECTS scale	Mean	7.46	8.86	NS (p=0.067)
	7	11(36.7%)	4(13.3%)	
	8	11(36.7%)	9(30%)	
	9	3(10%)	4(13.3%)	
	10	5(16.6%)	13(43.4%)	
NIHSS scale (initial)	Mean	13.23	14.26	NS (p=1)

	0-5	0(0%)	0(0%)	
	6-11	5(16.6%)	5(16.6%)	
	12-18	22(73.4%)	22(73.4%)	
	≥19	3(10%)	3(10%)	
OTN (min)	Mean	**198.4**	**173.07**	**S (p=0.016)**
	≤60	0(0%)	0(0%)	
	60-120	8(26.7%)	4(13.3%)	
	121-180	6(20%)	15(50%)	
	181-270	11(36.7%)	11(36.7%)	
	>270	5(16.6%)	0(0%)	

Table 2: Patient's clinical evolution

NIHSS scale after 24h	Mean	8	9	NS (p=0.8)
	0-5	9(30%)	10(33.3%)	
	6-11	8(26.7%)	8(26.7%)	
	12-18	12(40%)	10(33.3%)	
	>19	1(3.3%)	2(6.7%)	
mRS after 7 days	Mean	3	3	NS (p=0.088)
	0	7(23%)	2(6.7%)	
	1	5(17%)	4(13.3%)	
	2	1(3.3%)	8(26.7%)	
	3	2(6.7%)	3(10%)	
	4	4(13.3%)	6(20%)	
	5	5(16.7%)	5(16.6%)	
	6	6(20%)	2(6.7%)	
mRS after 3 months	Mean	2	2.5	S (p=0.002)
	0	13(43.4%)	4(13.3%)	
	1	7(23%)	7(23.3%)	
	2	0(0%)	6(20%)	
	3	0(0%)	5(16.6%)	
	4	1(3.4%)	3(10%)	
	5	1(3.4%)	1(3.4%)	
	6	8(26.8%)	4(13.4%)	
Symptomatic IH	Mean	2(6.7%)	2(6.7%)	NS(p=1)

1. Age and sex

For the first group (thrombolysed byTenecteplase): The mean age of the patients was 67.3 ± 15.64 years, a median of 65 years and extremes from 27 to 93 years. 53% of patients was aged> 65 years with a slight feminine predominance 53%.

For the second group (thrombolysed by Alteplase): The mean age was 68.08 ± 10.3 years,65 years for the median, extremes from 42 to 85 yearsand 43% women.66.7% of patients was aged> 65 years.

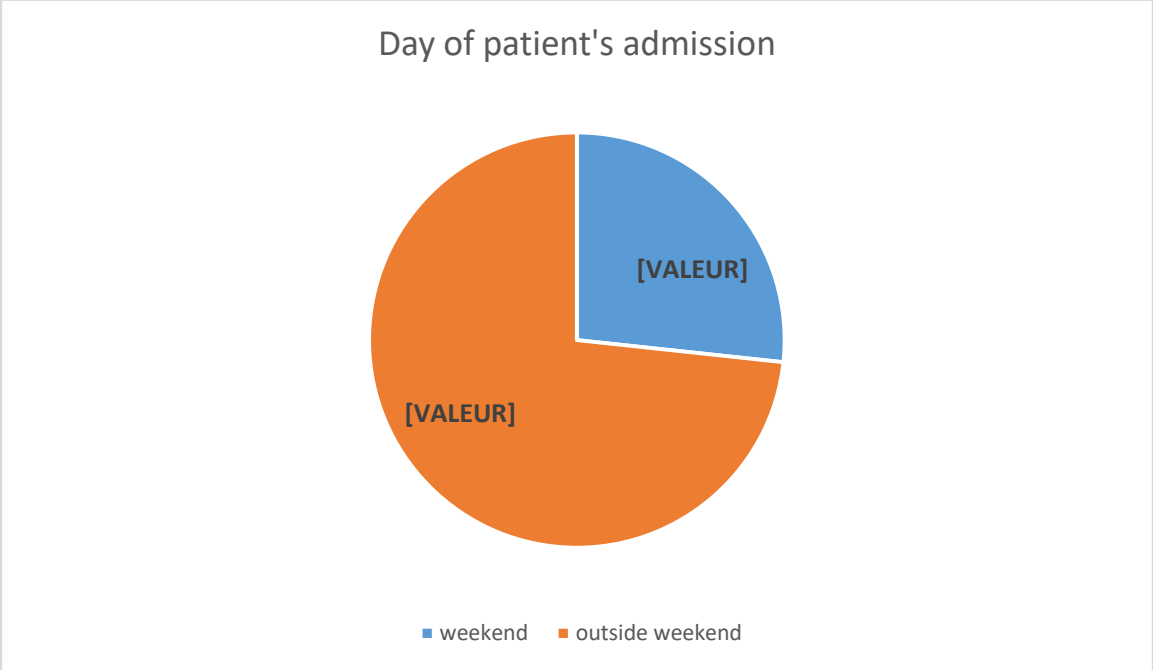
Table 3:The mean age and the administration delay ofthrombolysed agent

Thrombolysed agent		Age	Administration delay
Tenecteplase	Mean	67,30	189,40
	Number	30	30
	Standard deviation	15,641	77,700
Alteplase	Mean	68,87	173,07
	Number	30	30
	Standard deviation	10,308	48,127
Total	Mean	68,08	181,23
	Number	60	60
	Standard deviation	13,157	64,604

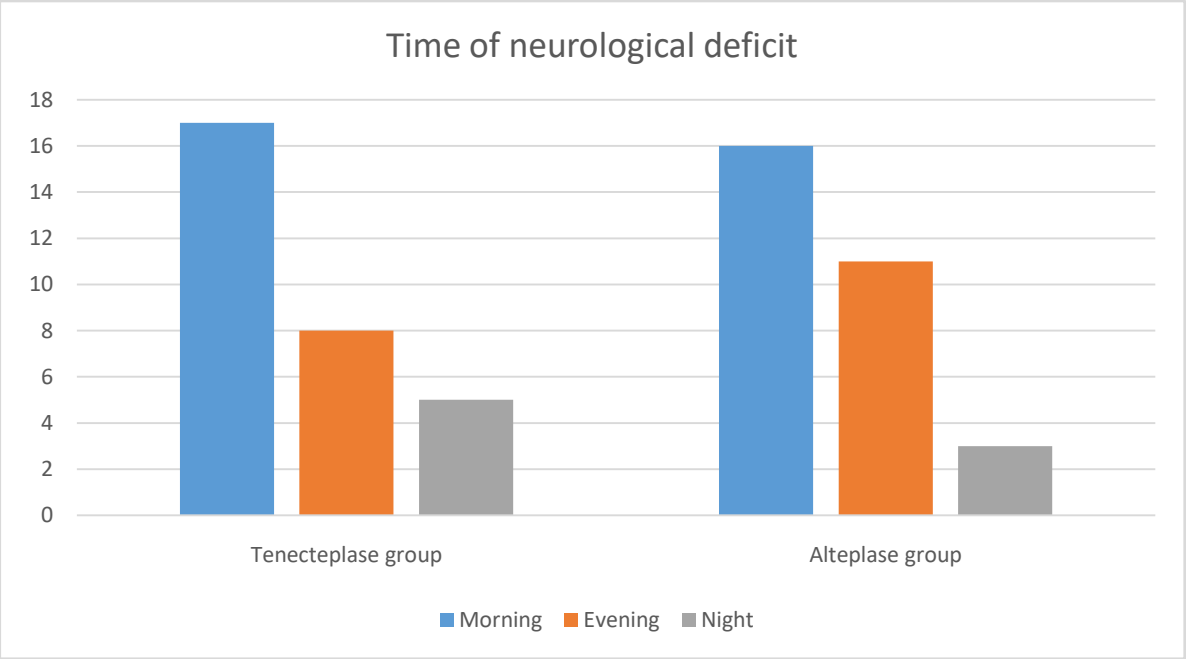
2. Day and time for patient's admission

26.7% of patients were admitted on week-ends.

The comparison for the admitted time on weekend or outside the weekend between the two groups had no statistically significant difference (weekend group 20% versus 33.3% for the other group; **p.value = 0.243**).



The thrombolysed patients by Tenecteplase had a neurological deficit occurred during the day for 17 patients (57%),in the evening for 8 patients (26%), at night in 5 patients (17%). For the second group, it was 16 (53%) during the day, 11(37%) in the evening and 3 patients (10%) at night. **p value =0.5** (no significant difference).



3. Initial National Institute of Health Stroke Score (NIHSS)

The mean of initial NIHSS scale for the Tenecteplase groupe was 13.23 ± 3.15and 14.26± 3.08 for the Alteplase group, the extremes from 8 to 21. 83.4% of patients had a NIHSS> 12 for the both groups. It had no statically significant difference **(p value =1).**

Table 4: InitialNIHSS scale

NIHSS initial	Tenecteplase (n=30)	Alteplase (n=30)	Signification (p)
Mean	13.23	14.26	NS (p=1)
0-5	0(0%)	0(0%)	
6-11	5(16.6%)	5(16.6%)	
12-18	22(73.4%)	22(73.4%)	
≥19	3(10%)	3(10%)	

4. Alberta Stroke Program Early C-T Score (ASPECTS)

The mean of the ASPECTS scale for the group of Tenecteplase was 7.46 ± 1.08, the extremes were 7 to 10.For the other group (Alteplase) the mean was 8.86 ± 1.13 and the extremes from (7-10).13 patients had a scale of 10 in the Alteplase group, however it was 10 for 5 patients thrombolysed by Tenecteplase (A great parenchyma for the Alteplase group).The comparison of the ASPECTS between our groups had no statically significant difference; **p value = 0.067**

Table 5: Comparison ofASPECTS scalebetween thetwo groups

ASPECT scale	Tenecteplase (n=30)	Alteplase (n=30)	Signification(p)
Mean	7.46	8.86	NS (p=0.067)
7	11(36.7%)	4(13.3%)	
8	11(36.7%)	9(30%)	
9	3(10%)	4(13.3%)	
10	5(16.6%)	13(43.4%)	

5. Thrombolytic agent used

All patients were thrombolysed, 30 had a Tenecteplase at a dose of 0.25 mg / kg given in intravenous bolus in one minute and 30 thrombolysed by Alteplase at 0.9 mg / kg (10% of the dose in 1 minute and 90% of the dose in 1 hour).

6. Time for administration the thrombolytic agent: Onset-to-needle time (OTN)

The Mean of OTN was 198.4± 77.7 minutes with a median of 187 minutes and extremes of 63 and 360 minutes for the first group (Tenecteplase), against a mean of 173.07 ± 48.13 minutes with a median of 163.5 minutes and extremes of 85 and 260 minutes for the second group (Alteplase). The Tenecteplase group was thrombolysed 23.5 minutes later than the Alteplase group.It had a statically Significant difference (**p. value = 0.016**).

Table 6: Time for administration the thrombolytic agent(OTN)

OTN	Tenecteplase (n=30)	Alteplase (n=30)	Signification (p)
≤ 60	0 (0%)	0 (0%)	S (p=0.016)
61 – 120	8 (26.7%)	4 (13.3%)	
121 – 180	6 (20%)	15 (50%)	
181 – 270	11 (36.7%)	11 (36.7%)	
>270	5 (16.6%)	0 (0%)	

7. Evolution

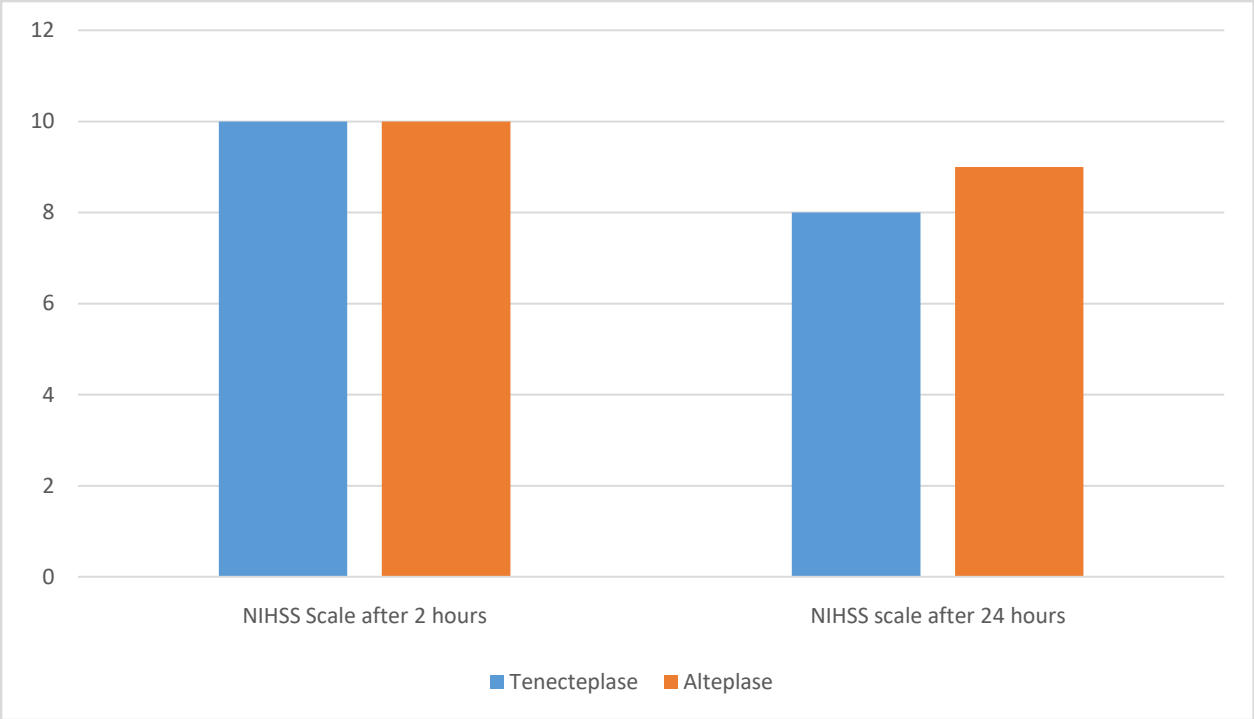
7.1. NIHSS after 2 hours and 24 hours

The mean NIHSS scale was improved after thrombolysis in the both groups.

For the Tenecteplase group it was 13 in admission, 10 after 2h and 8 after 24h.For the Alteplase group it was 14 in admission, 10 after 2h and 9 after 24 hours with nostatically significant difference (**p=0.4 and 0.8 respectively**).

Table 7: NIHSS scale after 2 and 24 hours

Thrombolysed agent	Mean/Intervals	Tenecteplase (n=30)	Alteplase (n=30)	Signification (p)
NIHSS Scale after 2 hours	Mean	10	10	NS (p=0.4)
	0-5	5(16.7%)	7(23.3%)	
	6-11	10(33.3%)	11(36.7%)	
	12-18	15(50%)	10(33.3%)	
	>=19	0(0%)	2(6.7%)	
NIHSS Scale after 24 hours	Mean	8	9	NS (p=0.8)
	0-5	9(30%)	10(33.3%)	
	6-11	8(26.7%)	8(26.7%)	
	12-18	12(40%)	10(33.3%)	
	>=19	1(3.3%)	2(6.7%)	



7.2. Rankin scale after 7 days and 3 months

The Rankin mean after 7 days was 3 for the two groups(modified Rankin scale between 0 and 6), while the Rankin at 3 months was 2 for Tenecteplase group and 2,5 for the Alteplase group. It hada significant difference: **p=0.002**

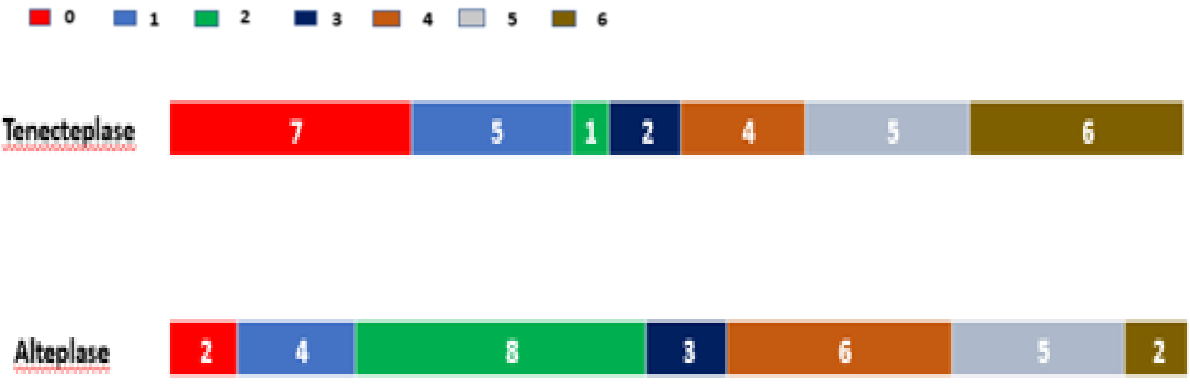


Figure 4: modified Rankin scale (mRS scale)

Rankin scale after 7 days

Rankin scale after 3 months

Rankin scale after 3 months	Tenecteplase (n=30)	Alteplase (n=30)	Signification (p)
Good outcomes (mRS: 0-2)	20 (66.7%)	17 (56.7%)	
Bad outcomes (mRS: 4-6)	10 (33.3%)	8 (26.7%)	S (p=0.002)

8. Hemorrhagic transformation and death during hospitalization

The rate of hemorrhagic transformation on the control CT scan was 20% (12/60): 5 patients thrombolysed by Tenecteplase and 7 by Alteplase. Hemorrhagic transformation was the reason of death for 4 patients (2 thrombolysed by Alteplase and 2 by Tenecteplase) without significant difference (**p.value=1**).The others raisons of death in the Tenecteplase group were (inhalation pneumonia for 2 patients, a large extended cerebral lesion for 1 patient, no more information for 1 patient, the same thing for the 2 other patients thrombolysed by Alteplase (no documents).

Table 8: Hemorrhagic transformation and the clinical evolution in the Tenecteplase and the Alteplase groups

	Tenecteplase (n=30)	Alteplase (n=30)	Signification (p)
Hemorrhagic transformation (HT)	5 (16.7%)	7 (23.3%)	NS (p=0.7)
Death by HT	2 (6.7%)	2 (6.7%)	NS (p=1)
mRs (4-5-6) after 3 months	10 (33.3%)	8 (26.7%)	NS (p=0.8)

DISCUSSION

Among patients with acute ischemic stroke from major cerebral vessel occlusion within 4.5 hours after the onset of symptoms, intravenous thrombolysis,combined or not with endovascular thrombectomy,increase the incidence of reperfusion for the occlused vascular territory [11].

In this retrospective study, patients with acute ischaemic stroke treated by Tenecteplase had similar rates of excellentclinical outcome in an ordinal analysis of the NIHSS scale after 2 and 24 hours andmodified Rankin scale after 7 days. Although the patients thrombolysed by Alteplase had a better parenchyma (ASPECTS scale at 10) and better time for administration of thrombolytic agent (Onset-to-needle time: OTN), the mRs scale after 3 months was overall similar for the two groups (Tenecteplase and Alteplase group) and so the percentage of death was higher in the Tenecteplase group.Our study hadalso shown that symptomatic intracranial haemorrhage occurred in four of 60 patients (6%) (2 had been thrombolysed by Alteplase and 2 by Tenecteplase). The Tenecteplase group was thrombolysed 23.5 minutes later than the Alteplase group. It was probably due to the time of realization the CT angiography in order to discuss an endovascular treatment (It was not systematically performedbefore, for the Alteplase group). However, the ability to administer Tenecteplase in a single bolus, as compared with the 1-hour infusion of Alteplase, maybe of practical benefit in patients with stroke with large-vessel occlusion who are transported between, as well as within, hospitals to access endovascular thrombectomy, but this was not formally assessed in this study. Our results are confirmed by the 2 other studies in the literature (NOR-TEST and ATTEST):

The Norwegian tenecteplase stroke trial (NOR-TEST) (2014) is the first randomised controlled phase 3 trial to investigate the safety and efficacy of Tenecteplase as a dose of 0.4 mg/kg (single bolus) compared to Alteplase 0.9 mg/kg(10% bolus + 90% infusion/60 minutes) for consecutively admitted patients with acute ischaemic stroke. A large number of patients were recruited (954 patients) within the planned inclusion period [15].The results of the study are likely to be generalisable to a substantial proportion of patients treated in a modern stroke unit [8]. NOR-TEST aims to detect a 9% higher percentage excellentOutcome with Tenecteplase versus Alteplase. This study have also shown that symptomatic intracranial haemorrhage after thrombolysis was occurred in 15 (3%) of Tenecteplase patients against 13(2%) in the Alteplase groupindicating that a Tenecteplase dose of 0·4 mg/kg might be approximately equivalent to 0·9 mg/kg Alteplase [12,13,14].There was no difference in majorneurological improvement at 24 h or ordinal shift analysis at 3 months. By 3 months, 29 (5%) of 549 patients had died in the Tenecteplase group compared with 26 (5%) in the Alteplase group.So in this study, Tenecteplase was similar to Alteplase for treatment of acute ischaemic stroke and had a similar safety profile which confirmed the results of our study.

ATTEST (Alteplase versus Tenecteplase for thrombolysis after ischaemic stroke) (February 26,2015)is a phase 2, prospective, randomised,open-label study. The patients were recruited from The Institute of Neurological Sciences included 52 patients givenTenecteplase0.25 mg/kg and 51 given Alteplase [17,18,19]. Intracerebral hemorrhage was seen in eight patients: 15% in the Tenecteplase group and 27% in the Alteplase group. Only one patient (2%) in the Tenecteplase group had a parenchymal hemorrhagecompared with five (10%) in the Alteplase group. The incidence of symptomatic intracerebral haemorrhage did not differ between treatment groups [16].This study have shown that the efficacy of Tenecteplase are similar than the Alteplase [20,21],but the increased ease of administration alone could offer an advantage of Tenecteplase, because delays between initial bolus and initiation of maintenance infusion are common with Alteplase and might compromise effectiveness [22, 23].

EXTEND-IA trial (April 26,2018):Is a multicenter,prospective, randomized, open-label, blinded outcome trial involving patients with ischemic stroke within 4.5 hours after onset who hadlarge-vessel occlusion of the internal carotid,middle cerebral, or basilar arteryand who were eligible to undergo intravenous thrombolysis and endovasculartrombectomy.202 patients were enrolled at 12 centers in Australia and at 1 center in New Zealand [24, 25]. 101patients were assigned to receive the Tenecteplase and 101 the Alteplase. In patients who were transferred or not to anotherhospital, the delay between thrombolysis andarterial puncture did not differ significantly betweenthe Tenecteplase group and the Alteplasegroup. In an ordinal analysis of the modified Rankinscale score at 90 days, patients in the Tenecteplasegroup had a median score of 2 which indicated significantlybetter function than the median score of 3 among patients in theAlteplase group. The median NIHSS score at24 hours was 3among patients in the Tenecteplase group and 6in theAlteplase group At 72 hours, the median NIHSS score was2 in the Tenecteplase group and 3 for the Alteplasegroup. There were 10 deaths in the Tenecteplasegroup and 18 in the Alteplase group.For theReperfusion rate, it was greater than 50% for 22 Tenecteplase patients (22/101), and 10/101 for the Alteplase group. So this study have shown that Tenecteplase was more efficient than Alteplase in intravenous thrombolysis before an endovascular thrombectomy.

Table 9: Comparison of clinical outcomes between tenecteplase and alteplase

Studies	NOR-TEST (2014) (n=954)		AT-TEST (2015) (n=96)		EXTEND-IA (2018) (n=202)		Our study (2019) (n=60)	
Thrombolysis agent	Tenecteplase (n=549)	Alteplase (n=551)	Tenecteplase (n=52)	Alteplase (n=51)	Tenecteplase (n=101)	Alteplase (n=101)	Tenecteplase (n=30)	Alteplase (n=30)
Age, mean (years)	70.8	71.2	71	71	70.4	71.9	67.3	68.08
Sex (percentage)	M=321(58%)	M=339(62%)	M=30(64%)	M=31(63%)	M=58(57%)	M=52(51%)	M=14(47%)	M=17(57%)
Initial NIHSS, mean	5.6	5.8	12	11	17	17	13	14
OTN mean (min)	111	111	184	192	125	134	198	173
NIHSS after 24h	-	-		-	3	6	8	9
mRS after 3 months	0=202(37%) 1=152(28%) 2=67(12%) 3=48(9%) 4=47(9%) 5=4(<1%) 6=29(5%)	0=173(31%) 1=172(31%) 2=87(16%) 3=47(9%) 4=36(7%) 5=10(2%) 6=26(5%)	0=3(6%) 1=10(21%) 2=4(9%) 3=11(23%) 4=9(19%) 5=2(5%) 6=8(17%)	0=2(4%) 1=8(17%) 2=9(19%) 3=11(23%) 4=9(19%) 5=3(6%) 6=6(12%)	0=28(27%) 1=21(21%) 2=14(14%) 3=14(14%) 4=8(8%) 5=6(6%) 6=10(10%)	0=18(18%) 1=23(14%) 2=9(9%) 3=12(12%) 4=14(14%) 5=7(7%) 6=18(18%)	0=13(43.4%) 1=7(23%) 2=0(0%) 3=0(0%) 4=1(3.4%) 5=1(3.4%) 6=8(26.8%)	0=4(13.3%) 1=7(23.3%) 2=6(20%) 3=5(16.6%) 4=3(10%) 5=1(3.4%) 6=4(13.4%)
Symptomatic IH	15(3%)	13(2%)	4(8%)	6(12%)	1(1%)	1(1%)	2(6.7%)	2(6.7%)

Patients in all patients from the clinical studies

In our retrospective study, the comparison between the Alteplase 0.9 mg/kg and Tenecteplase at the dose of 0.25 mg/kg in vessel recanalization, indicate that Tenecteplase was significantly similar to Alteplase in the efficacy, safety and the ease of utilization for Moroccan population. Tenecteplase treatment was also associated with globally similar clinical outcomes and rate of hemorrhagic transformation compared to Alteplase in patients with a vessel occlusion. However we had some limits in this study as well as the lack of data for the Alteplase group (loss of some records and the evolution of patients especially for the old recruiting patients). So a large prospective clinical trial is necessary to confirm our results and confirm definitely the ability to use the Tenecteplase as the thrombolytic agent number 1.

CONCLUSION

The use of Tenecteplase 0.25 mg/kg is clinically justified andoverall similar in efficacy and safety to Alteplase 0.9 mg/kg while managing acute ischemic stroke. However, the ease of administration (just an intravenous bolus and no maintenance infusion) could offer an advantage to Tenecteplase over Alteplase, because of the delays between initial bolus and initiation of maintenance infusion are common with Alteplase and might compromise effectiveness [26]. A new clinical trial in our center is prospected in order to confirm our results for Moroccan population: ESTATIS (Efficacy and safety of Tenecteplase versus Alteplase in thrombolysis of ischemic stroke in developing countries).

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