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OUTCOMES OF THROMBOLYTIC THERAPY AMONG ACUTE ISCHEMIC STROKE IN REHMAN MEDICAL INSTITUTE PESHAWAR

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ABSTRACT

Stroke is a critical neurological emergency and a leading cause of mortality and long-term disability worldwide, with ischemic stroke accounting for approximately 80–85% of cases. Rapid diagnosis and timely intervention are essential to minimize neuronal damage and improve functional outcomes. This study aimed to evaluate the outcomes of thrombolytic therapy in patients with acute ischemic stroke at Rehman Medical Institute (RMI), Peshawar. A cross-sectional observational study was conducted over six months, including 185 patients aged ≥18 years who received intravenous thrombolytic therapy (alteplase). Data were collected from emergency and neurology departments using a structured questionnaire and analyzed using SPSS version 23.0. Patients with hemorrhagic stroke or those on anticoagulant therapy were excluded. Results demonstrated that 165 (89.2%) patients showed significant clinical improvement following thrombolytic therapy, while 20 (10.8%)

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did not improve. Male patients constituted 51.35% of the sample, and females 48.65%, with slightly higher improvement rates observed in females. Age-wise analysis revealed that patients over 60 years showed the highest proportion of improvement, though also accounted for most non-improved cases. Urban residents had better outcomes compared to rural patients. The majority (73.5%) received treatment in the emergency department, where higher improvement rates were observed. Complications included intracranial hemorrhage in 9.73% and seizures in 15.14% of patients. The in-hospital mortality rate was 7%, with higher mortality among males. In conclusion, thrombolytic therapy with alteplase significantly improves outcomes in acute ischemic stroke patients when administered timely, although associated risks such as hemorrhage and seizures remain important considerations.

INTRODUCTION

The abrupt start of neurological damage brought on by vascular damage to the brain's nerve cells, such as ischemia of the brain, intracranial bleeding, or subarachnoid bleeding, is known as a stroke. The death of neurons in the brain because of ischemic carried about by an intracranial blockage is known as "cerebral ischemia" in medical terminology. The most typical kind of stroke is known as ischemic stroke. It is the leading global reason for death & long-term impairment. A life-threatening situation is having a stroke as the quicker someone receives medical attention, the lesser the neurological harm they'll sustain. When evaluating individuals who are initially accused of suffering a stroke, imaging is crucial. A frequent form of stroke is an ischemic stroke. A stroke is an urgent medical matter. The fifth-leading cause of long term impairment after cancer and heart disease is stroke.(1)

A stroke represents a focused cerebral ailment that may be present momentarily or continuously in a specific area of the nervous system and is brought on by cardiovascular disease (CVD). Stroke is a serious medical condition that affects people all over the globe & is the second-greatest cause of mortality in poor nations and the third-greatest cause of impairment in industrialized nations. Because it can be prevented and treated, it also occupies a significant position. The nerve cells in the core of the injured region of the brain tissue suffer permanent harm in strokes that are ischemic. It is possible to repair the harm done to the nerve cells in the penumbra, which is a zone near the edge of this area. Restoring function is the major objective of stroke therapy. . Restoring blood flow to the penumbra and minimizing functional loss are the primary goals of stroke therapy. In industrialized countries, ischemic stroke is one of the most common causes of impairment. 80–85% of the cases are ischemic, whereas 15%–20% are hemorrhagic. (2)

Stroke ranks sixth overall causes of mortality in the USA and is a major contributor to permanent disability. According to the CDC's stroke statistics, eighty-seven of attacks were (AIS) is and 1 in 4 attacks are recurrence attacks (3). The threat of ischemic stroke is higher in older people and in individuals with many multiple medical conditions, and strokes is still one of the major causes of fatalities and disabilities in the globe. It usually turns out that cardiac risk factors, including arterial blood pressure, diabetes, high cholesterol levels, & irregular heartbeats (AF), are linked to stroke caused by ischemic attack. Whether those risk factors are

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managed in accordance with current recommendations, polypharmacy is frequently the result. . Data on the relationship with multiple medications and strokes result as well as the management of acute stroke, however, are few (4).

1.2. RISK FACTORS:

The aging population's growth and rising strokes-related costs, the rate of strokes is rising globally. Stroke can happen for a variety of causes, including risk factors that cannot be changed (age, genetics, gender), and also factors that can be changed (diet, lack of exercise, multiple medical conditions, and ecological variables).Stroke severity (determined via National Institutes of Health (NIHSS) strokes scale), high systolic blood pressure, acute hyperglycemia, use of antiplatelet medications in the past or concurrent use for antiplatelet medications, weight gain, low platelet levels, and a history of other comorbid conditions (atrial fibrillation, hypertension(5) A major cause of risk for ischemic stroke, atrial fibrillation (AF) affects more than 37 million people worldwide (6).

1.3. CAUSES:

Cortical, cerebellar, brainstem, & subcortical infarction that are larger than 15-20 mm frequently occur by macro vascular disease brought on by atherosclerotic of the cervical or proximal intracranial veins. Acute cerebrovascular accident is the primary factor in cases 3-5 and 30-43%. 20-31% of acute strokes were the result of cardio embolic causes. Additional reasons include blood diseases, right-to-left venous shunting or hyper coagulable conditions, arterial dissection. Artery detachment is another uncommon reason for an acute stroke.(7) Higher uric acid levels were linked to an increased risk of sequelae and relapses in a study of 163 individuals with non embolic ischemic stroke.(8)

1.4. EPIDEMIOLOGY:

According to the CDC's attack statistical data, arterial ischemic stroke (AIS) makes up around eighty-seven percent of all strokes, while repetitive stroke represents about half of all strokes. Based to an international prevalence survey, 68% of individuals suffered a first stroke among the year 2010, in which 84 percent all those who suffered a stroke escaped their first stroke, and a total of 26 percent of people died from a stroke in 2010. The disease's burden increased significantly since the year 1990, particularly throughout low-and middle-income countries (1)

After coronary artery disease, stroke is the second main cause of mortality overall as well as emerging economies, and it is the third biggest cause of disablement globally & in wealthy nations. The Turkish Statistical Institute reports that in the same year, ischemic stroke was ranked as the second leading cause fatality in Turkey, causing 22.4% of all deaths.(2)According to 2015, statistics, Romania has the European highest rates of new stroke cases and stroke-related deaths(5) Stroke is an increase, a new study found. Every 40 seconds, someone in the US has a new or repeated stroke, bringing the annual total to an estimated 780000 cases. Stroke is one of the largest causes of mortality worldwide, behind cancer and cardiovascular disease, and the leading cause of death among elderly people(8). Stroke has reached epidemic proportions in LMICs, which now account for two-thirds of worldwide stroke incidence and eighty-five percent of global stroke death. Over the previous decade, annualized stroke rates in India fluctuated between 105 and 152/100,000. Ischemic stroke accounted for around 68.6% to 83.6%, and about one third of patients had

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moderate to severe impairment because of the stroke (9).

1.5. THROMBOLYTIC THERAPY

Acute ischemic strokes (AIS) Patients who report within the first four hours of the first symptom, as well as individuals with only minor symptoms of lesion development on the starting point examination. typically receive intravenously alteplase (10). Patients with acute ischemic stroke who come within 4.5 hours of symptom onset are encouraged to undergo intravenous thrombolysis (IVT) with alteplase according to the latest American Heart Association/Stroke recommendations).(11)

The only approved medical treatment for a stroke that is acutely ischemic is intravenously thrombolytic therapy with alteplase, which must be started within three hours after the beginning of symptoms. Individuals with an acute ischemic stroke whose was given the alteplase (0.9 mg per kilograms of body weight) within 3 hours of the onset of symptoms had a 30% greater chance of having little or no disability at the end of three months compared with those who got placebo, based on a study published in 1995 by the National Institute of neurological disorders and strokes (NINDS). If delivered within three hours after a patient's stroke starts, alteplase is considered a first-line therapy under international criteria. In 2002, alteplase received clearance from the European Medicines Agency (EMEA)(12).

IV thrombolysis is a tried and reliable method of treating AIS. Since the 1995 NINDS study, it has been widely used for stroke during the first three hours after symptoms appear. European Cooperative Acute Stroke Study (ECASS) III trial findings were released in 2008, and following then, thrombolytic therapy for AIS has been standard therapy for up to four hours after onset. Many stroke sufferers in London are first admitted to one of 8 Hyperacute Stroke Units (HASUs), which were established in 2010. To replace earlier stroke sentinel audits, the Sentinel Stroke **National Audit**

Programmee (SSNAP) was launched in 2013.(13)

Intravenous thrombolysis (IVT) is the standard therapy in ischemic stroke When provided during the first 4.5 hours following symptom onset followed by endovascular thrombectomy (MT). Ischemic vascular therapy (IVT) is advised "in the case of acute ischemic events on CT of low to moderate extent," as stated in the most recent AHA recommendations. Optimal treatment selection of candidates and the potential advantages and hazards of IVT administration have been a point of discussion since the Food and Drug Administration approved IVT method for the treatment of an ischemic stroke in 1996.(14)Ischemic stroke is on the rise in Thailand. If the patient's symptoms began within three to four and a half hours, then alteplase may be used as a thrombolytic drug to treat the ischemic stroke.(15)

European Cooperative Acute Stroke Study III [ECASS III] confirmed the effectiveness and efficacy of intravenous thrombolytic therapy with 0.9 mg/kg alteplase at 3-4.5 h following acute ischemic stroke (AIS). However, alteplase's usage in the window of 3-4.5hr has not been approved by the Food and Drug Administrations in the US and Taiwan. Low-dose alteplase was shown to be inferior to standard-dose alteplase in the Enhance Control of Hypertension and Thrombolysis stroke Study (ENCHANTED). Furthermore, the lowest dosage of alteplase now permitted in Japan is 0.6 mg/kg. The normal dosage of intravenous

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alteplase for AIS, as granted by the Taiwan Food and Drug Administration of Taiwan is 0.9 mg/kg.(16)

A lower white blood cell count on admission was related with early neurological recovery and positive functional outcome 90 days following stroke in clinical trials involving individuals receiving alteplase (recombinant human tissue plasminogen activator, rtPA) (17). In the US, alteplase is still the only publicly available thrombolytic for treatment of AIS. While other nations have authorized the use of Tenecteplase for the management of AIS, the United States does not currently have this approval(18). Stroke is the primary reason for permanent impairment and the second highest cause of death globally. To this day, alteplase is the only FDA approved intravenous thrombolytic drug for treating AIS. But there are also downsides to using alteplase, such as its short half-life and the need for continuous infusion for around an hour.(19)

Treatment benefits from intravenous alteplase for acute ischemic stroke decline with time. Therefore, alteplase is often only given to individuals in whom the time of stroke start is known, and therapy may be commenced within predetermined time restrictions; 4.5 hours after the stroke begins in Europe, within 3 hours of stroke onset in the United State (20).In those suffering from acute ischemic stroke (AIS) who are also taking direct oral anticoagulants, some recommendations advise avoiding thrombolytic therapy (IVT) using standard-dose (0.9mg/kg) alteplase. In patients within 7 days of their previous DOAC consumption, the risk of symptomatic ICH was similar to whether OACs were administered of the US hospital-based stroke registry, Get with The Guidelines-Stroke).(21)

Thrombolysis boosts blood flow to the recuperative ischemic penumbra By reanalyzing the blocked blood artery with r-tPA (recombinant tissue plasminogen activator).Worldwide, the incidence of sICH complicating thrombolysis ranges from 2.2% to 8%, from 4.87 to 7.3% in China, and from limited published research in India, there is considerable heterogeneity of the NINDS criteria)(9). When it comes to treating individuals with acute ischemic stroke (AIS), the U.S. Food and Drug Administration (FDA) has only authorized alteplase. Alteplase has the potential to save lives, but it has several drawbacks that reduce its effectiveness. These include its short half-life, partial and frequently delayed recanalization, danger of intracranial hemorrhage (ICH), and need for continuous infusion for around an hour.(22)

Current recommendations advocate an intravenous dosage of alteplase (0.9 mg/ kg) within 3 or 4.5 h after symptoms start for eligible patients with AIS. These guidelines are based on the results of studies such as the European Cooperative Acute Stroke Study (ECASS) and the National Institute of Neurological Disorders and Stroke (NINDS). Intravenous thrombolytic treatment with low dosage (0.6 mg/ kg) alteplase may be safe and efficacious in Japanese patients with AIS, according to the findings of the Japan Alteplase Clinical Trial (JACT) trial. In a Singaporean trial comparing standard-dose and low-dose alteplase thrombolysis, patients who received the higher standard-dose treatment had a more favorable a short-term clinical outlook and a decreased risk of cerebral hemorrhage. (23). The most up-to-date American Heart Association/Stroke Association AIS guideline suggests that TNK may be considered instead of ALT in certain individuals with AIS who have

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only mild neurological damage and no severe cerebral blockage. (24)

Alteplase is allowed for use in Europe Within 4.5 hours after stroke start, although until recently, regulatory requirements limited its usage to patients aged 18–80. About a third of all cases of acute stroke happen in adults older than 80. Guidelines provided by the European Stroke Organization and the American Stroke Association/American Heart Association no longer place an upper age restriction on the administration of alteplase, which they suggest being given to patients within 4.5 hours after the beginning of stroke symptoms. (25). Alteplase used intravenously prior to endovascular thrombectomy (EVT) is intended to hasten reperfusion (26). The FDA has only authorized alteplase as a thrombolytic for the therapy of ischemic stroke. Patients with a high systolic blood pressure, or SBP, on admission have been shown to have a lower functional outcome after undergoing intravenous thrombolysis (IVT) via alteplase, according to a recently published observations regarding Tenecteplase in clinical trials from New Zealand (27).

The best pharmacological therapy for acute ischemic stroke is immediate thrombolysis with alteplase Attaching to fibrin on the clot's surface, recombinant tissue plasminogen activator (rtPA) then activates plasminogen that is attached to fibrin. The fibrin-associated plasminogen is then broken, releasing the plasmin. Several recommendations support thrombolysis because it reduces symptoms and improves patients' prognoses by breaking down fibrin molecules and dissolving clots. (28). Elevated systolic blood pressure (SBP) upon admission has been linked to a worse functional result for individuals undergoing the use of intravenous thrombolysis (IVT) using alteplase,(29).

FDA given the green light that When it comes to thrombolytic therapy for the treatment of acute ischemic stroke (AIS), only alteplase has been given. When administered to qualified individuals before 4.5 h, there's a 28% reduction in impairment after ninety days, and a stronger correlation between speed of recovery and the absence of symptoms. Symptomatic bleeding occurs in 6% of all patients. After delivery of alteplase, there were no cases of cerebral bleeding in a stroke mimics cohort of 107.(30).

METHODOLOGY

Study Design

The observational cross-sectional study was conducted on the outcomes of patients who received Thrombolytic Therapy at Rehman Medical Institute Peshawar.

Study Settings

The secondary data was collected from Emergency and neurology ward of Rehman Medical Institute Hayat Abad Peshawar Pakistan

Study Duration

Study duration for this research work was 6 months w.e.f January 2025 to May 2024.

Sample Size

Using the WHO sample size calculator, the sample size for this study was 185, based on previous studies with 14% prevalence ,95% confidence interval, and margins of error 5%.

$$N = \frac{P(1-P)Z^2}{E^2}$$

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P stands for prevalence.
Z is the z-score for the selected level of confidence. The z-score represents a 95% confidence interval.
E stands for margin of error.
The number N represents the size of the population.

Sampling Technique

Non Probability Convenient Sample technique.

Inclusion Criteria:

1)patients with acute ischemic stroke
2)Patient with thrombolytic therapy Patient age above 18years

Exclusion Criteria

1)Patients with hemorrhagic stroke
2) Patients receiving blood thinner for other comorbidities.

Data Collection Procedure

This cross-sectional study was conducted for 3-4 months at Rehman Medical Institute Hayat Abad Peshawar. Data was collected through a self-administered Questionnaire.

Data Analysis Procedure:

For data analysis we use SPSS (statistical package for social sciences) software version 23.0.

Ethical Consideration:

Ethical considerations were adhered to with informed consent obtained from all participants prior to enrollment in the study.

RESULTS

Stroke is a serious medical condition that affects people all over the globe & is the second-greatest cause of mortality in poor nations and the Third-greatest cause of impairment in industrialized nations. The only approved medical treatment for a stroke that is acutely ischemic is intravenously thrombolytic therapy with alteplase, which must be started within three hours after the beginning of symptoms. As our study shows that , a total of 185 Patients were treated with Thrombolytic Therapy among Acute Ischemic Stroke in RMI.

Out of 185 patients, 165 (89.2%) Patients were improved and 20 (10.8%) Patients were not improved as shown in (figure 1)

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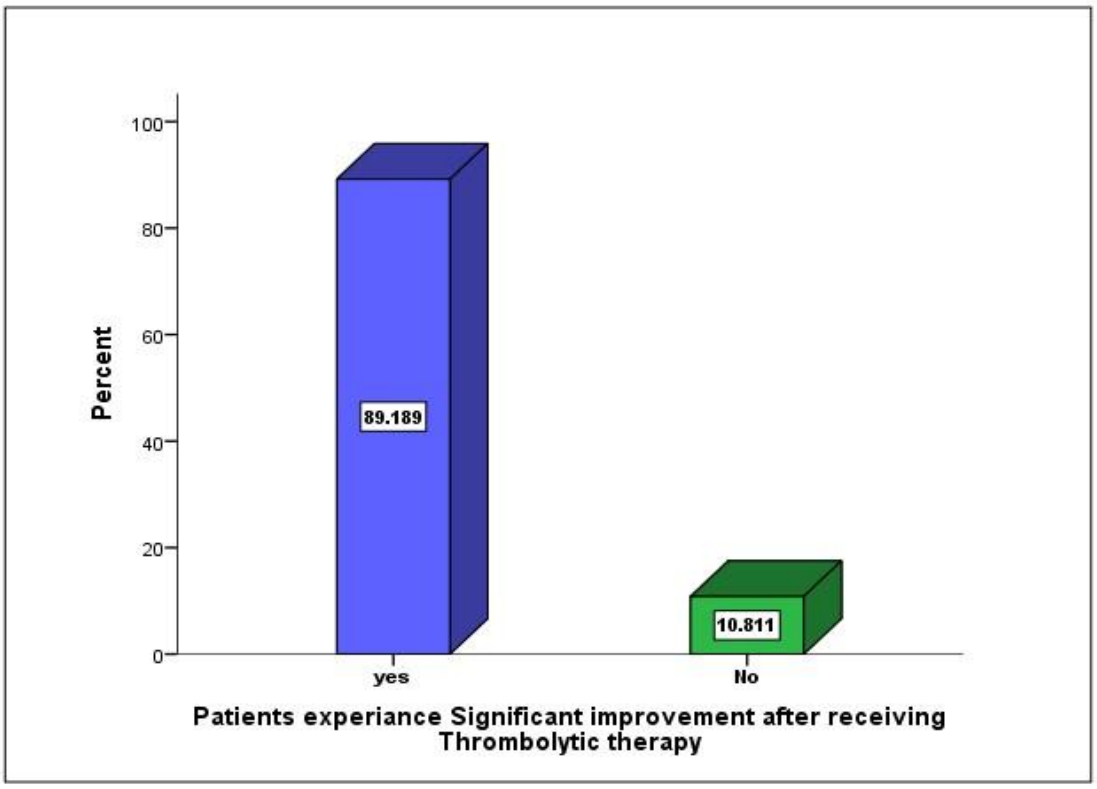


Figure 1: Significant Improvement after receiving Thrombolytic Therapy.

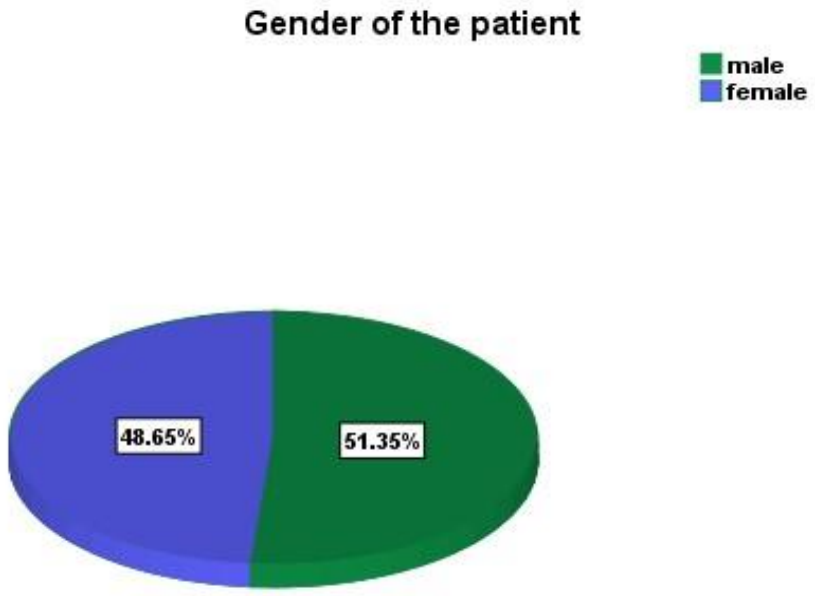


Figure 2: Gender of patients received Thrombolytic therapy

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Out of 185 Patients 95 (51.35%) were males Patients and 90 (48.65%) were females Patients as shown as in figure 2.

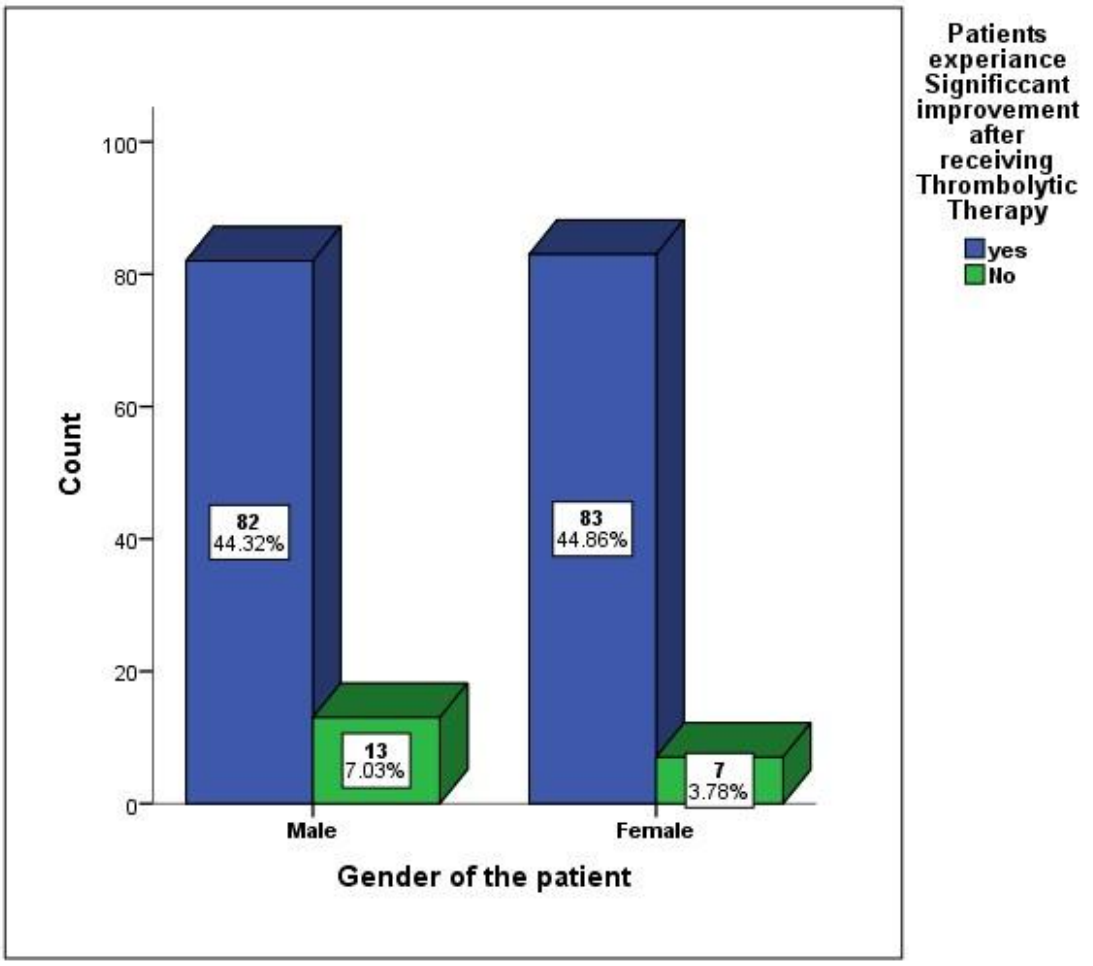


Figure 3: Significant improvement with Gender distribution

Out of 95 male 82 (44.32%) were improved and 13 (7.03%) were not improved .while out of 90 Females 83 (44.86%) were improved and 7 (3.78%) were not improved Patients.This chart shows high ratio of Improvement of Patients in Females over Males patients as shown in (figure 3).

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Table 1: ***Age distribution of improvement after Thrombolytic Therapy***

		Patients experience significant improvement after receiving Thrombolytic Therapy		Total
		YES	NO	
Age of patients years	18-30 years	3(1.62%)	0(0.00%)	3(1.62%)
	31-45 years	20(10.81%)	0(0.00%)	20(10.81%)
	46-60	53(28.65%)	6(3.24%)	59(31.9%)
	> 60 years	89(48.11%)	14(7.47%)	103(55.7%)
Total		165(89.19%)	20(10.81%)	185(100%)

Among total of 185 patients 165(89.19) patient showed substantial progress after receiving Thrombolytic Therapy. Out of patients aged between 18-30 years 3(1.62%) individuals showed improvement while None (0) experience any regression. In the age group of 31-45 years there was improvement observed in 20(10.81%) with NO (0) instance of regression. In the age range of 46-60 years there were positive Outcomes observed in 53(28.65%) while 6(3.24%) patients did not show improvement. Patients aged greater then 60 years 89(48.11) showed improvement while 14(7.47%) show instance of regression.

Out of 185 patients 20(10.81%) patients did not show positive functional outcomes of which 6 patients from aged 46-60 years and 14 patients from aged >60 years.

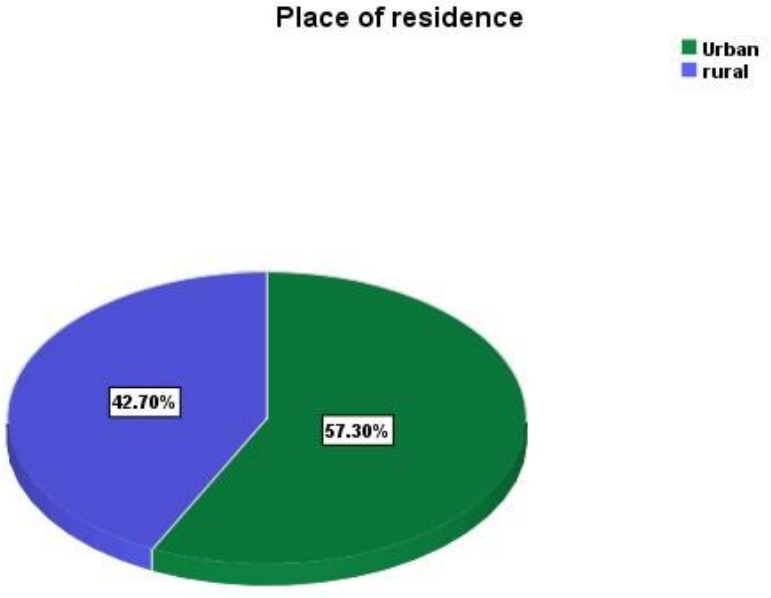


Figure 4: Place of Residence of patients

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Out of 185 Patients 106 (57.30%) patients were belonged to urban Areas and 79 (42.70%) were belonged from rural Areas.Out of 106(57.30%) Patients from urban Areas 98(52.97%) Patients were improved and 8(4.32%) Patients were not improved while from the 79(42.70%) Patients from rural areas 67(36.22%) were improved and 12(6.49%) were not improved .

The Study shows that ,the Rate of Improvement was High in urban Areas as compared to that of rural Areas.

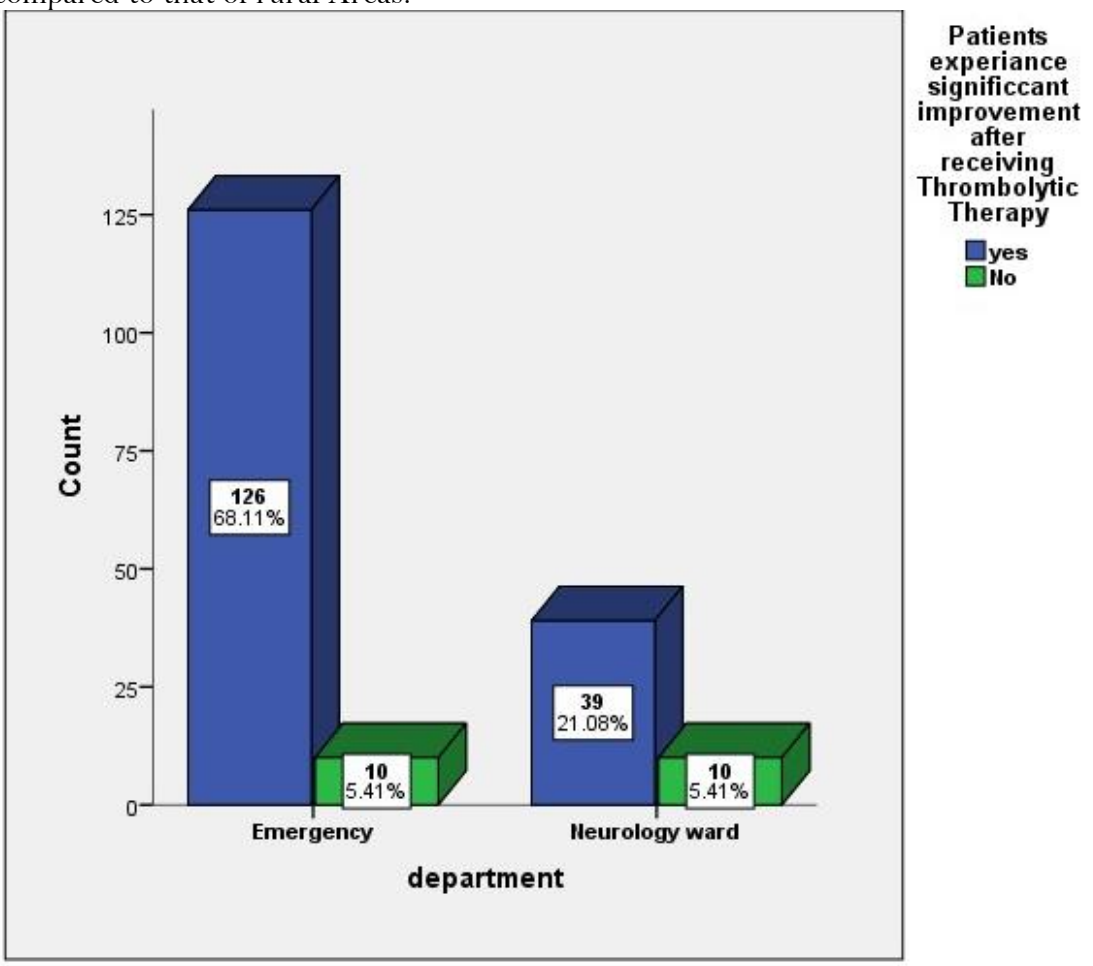


Figure 5: Department in which Patients received Thrombolytic Therapy

From out of 185 patients 136 (73.5%) patients received Thrombolytic therapy in emergency department and 49 (26.5%) patients received in Neurology Ward. From 136(73.5%) patients 126 (68.11%) were improved and 10 (5.41%) patients were not improved in emergency department. From 49(26.5%) patients 39 (21.08%) were improved while 10 (5.41%) patients were not improved in Neurology ward.

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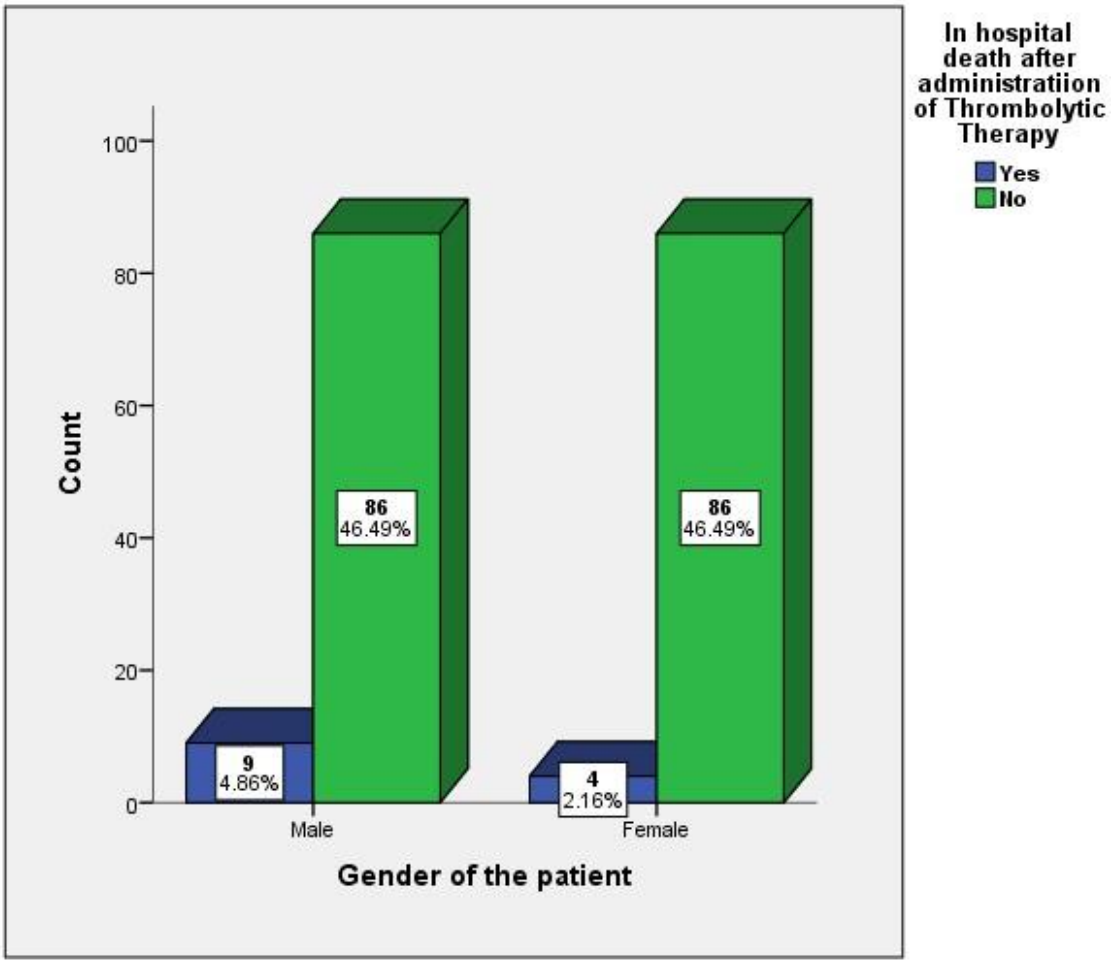


Figure 6: In hospital death after administration of Thrombolytic therapy

Out of 185 patients who received thrombolytic therapy 13 (7.0) patients were died. From 13 died patients the 9(4.6%) were Male patients and 4(2.16%) were Female patients.

This chart shows high ratio of death in Male over Female patients as shown in (Figure 6)

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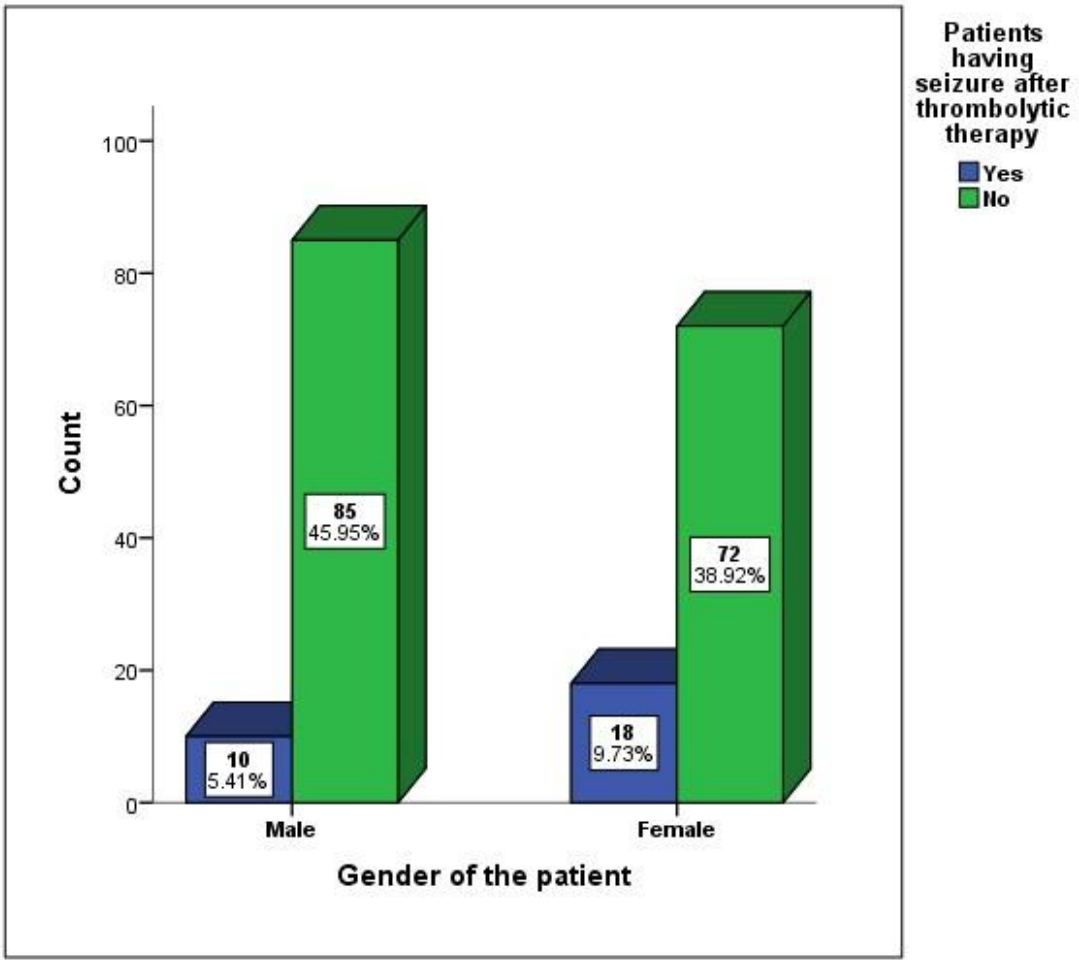


Figure 7: Patients having Seizure after receiving Thrombolytic Therapy

Out of 185 patients 28 (15.14%) patients produced Seizure after receiving Thrombolytic Therapy while 157 (84.86%) did not produced . From 28(15.14%) patients 10(5.41%) were Male patients while 18(9.71%) were Female patients. This chart shows the high ratio of Seizure in Female over Male patients as shown in (Figure7).

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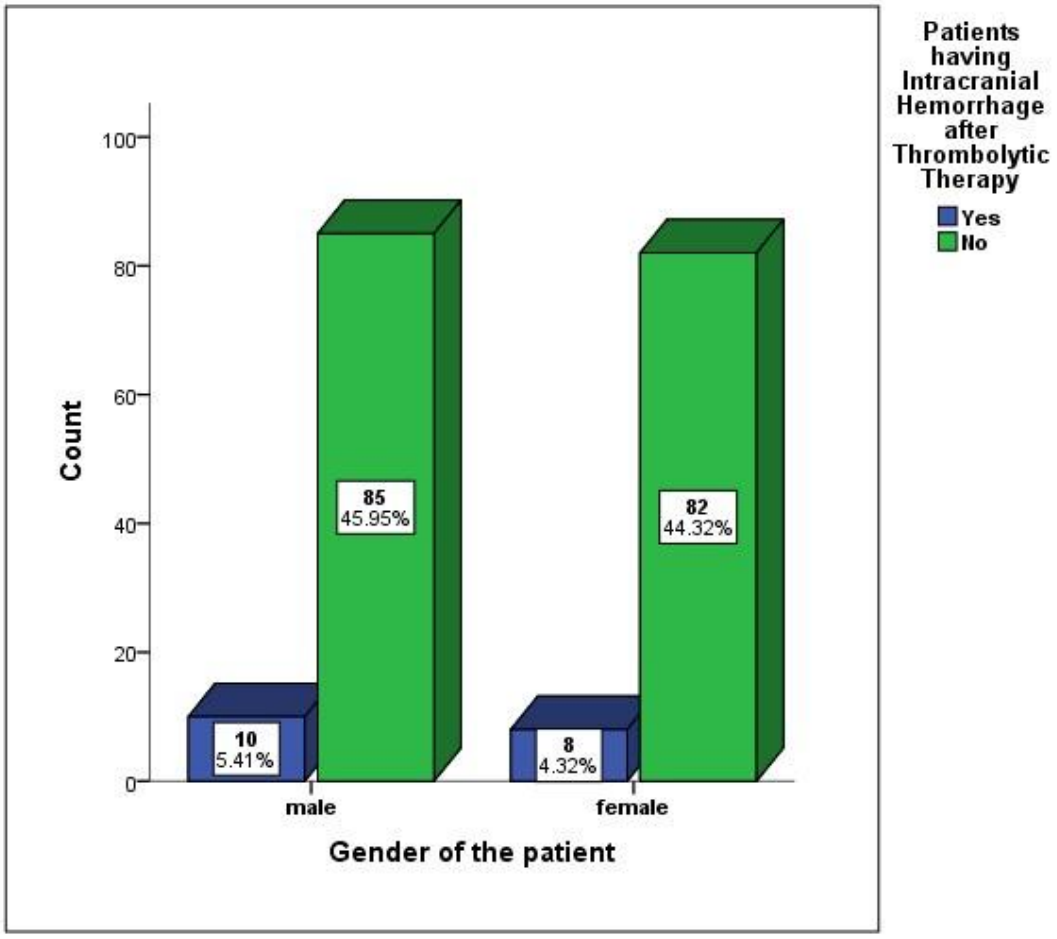


Figure 8: Patients having Intracranial hemorrhage after receiving Thrombolytic Therapy

Out of 185 patients who received thrombolytic therapy intracranial hemorrhage occurred in 18 (9.73%) patients. From these 18(9.73%) patients 10 (5.41%) were Male patients while 8(4.32%) were Female patients.

This chart shows high ratio of intracranial hemorrhage in Male over Female patients as shown in (Figure 8)

CONCLUSION

We determined that Thrombolytic Therapy showed substantial progress, however it did come with some issues like ICH and Seizures. Our study indicated a highly prevalence of ICH in Male patients, whereas Seizures were predominantly observed in Female patients. Furthermore, the mortality rate was observed to be comparatively higher in Male patients.

REFERENCES

Afridi SQ. Accuracy of Diffusion Weighted Imaging in the diagnosis and evaluation of Acute Ischemic Strokes. Isra Med J. 2023;14(3):99–103.

BOLATTÜRK ÖF. Factors affecting the presentation time of patients with acute stroke to hospital and level of awareness of thrombolytic therapy. J Heal Sci Med. 2023 Jan;6(1):77–81.

Alhadid K, Oliveira L, Etherton MR. Intravenous Thrombolytics in the Treatment

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http://amresearchreview.com/index.php/Journal/about

of Acute Ischemic Stroke. Curr Treat Options Cardiovasc Med [Internet]. 2023;25(1):15–28. Available from: https://doi.org/10.1007/s11936022-00973-2

Jensen M, Boutitie F, Cheng B, Cho TH, Ebinger M, Endres M, et al. Polypharmacy, functional outcome and treatment effect of intravenous alteplase for acute ischaemic stroke. Eur J Neurol. 2021;28(2):532–9.

Iancu A, Buleu F, Chita DS, Tutelca A, Tudor R, Brad S. Early Hemorrhagic Transformation after Reperfusion Therapy in Patients with Acute Ischemic Stroke: Analysis of Risk Factors and Predictors. Brain Sci. 2023;13(5).

Khan S, Naz H, Qadeer Khan MS, Ullah A, Satti DI, Malik J, et al. The WATCHMAN Device Review: A new era for stroke prophylaxis. J Community Hosp Intern Med Perspect. 2023;13(3):1–11.

Knight-Greenfield A, Nario JJQ, Gupta A. Causes of Acute Stroke: A Patterned Approach. Vol. 57, Radiologic Clinics of North America. W.B. Saunders; 2019. p. 1093–108.

Rehman OU, Rahman FU, Rahman S, Kakar ZUE, Razaq S, Wadood A. Prevalence of Hyperuricemia in Patients with Ischemic Stroke. Pakistan J Med Heal Sci. 2022;16(6):702–4.

Das S, Mondal GP, Bhattacharya R, Ghosh KC, Das S, Pattem HK, et al. Predictors of Postthrombolysis Outcome and Symptomatic Postthrombolysis Hemorrhage following Intravenous Thrombolysis with Alteplase for Acute Ischemic Stroke. J Neurosci Rural Pract. 2020;11(2):315–24.

Broocks G, Mcdonough R, Bechstein M, Hanning U, Brekenfeld C, Flottmann F, et al. Benefit and risk of intravenous alteplase in patients with acute large vessel occlusion stroke and low ASPECTS. J Neurointerv Surg. 2022;8–13.

Singh N, Almekhlafi M, Bala F, Ademola A, Coutts S, Deschaintre Y, et al. Authors : 2023;

Pierre Amarenco, Julien Bogousslavsky, Alfred Callahan 3rd, Larry B Goldstein, Michael Hennerici, Amy E Rudolph, Henrik Sillesen, Lisa Simunovic, Michael Szarek, K M A Welch, Justin A Zivin SP by AR in CL (SPARCL) I. 需要引用的霍奇金第二肿瘤new England Journal. N Engl J Med. 2011;365:687–96.

Huang X, Nash P, Alakbarzade V, Clarke B, Pereira AC. Clinical Outcomes after Intravenous Alteplase in Elderly Patients with Acute Ischaemic Stroke: A Retrospective Analysis of Patients Treated at a Tertiary Neurology Centre in England from 2013 to 2018. Stroke Res Treat. 2021;2021.

Broocks G, Heit JJ, Kuraitis GM, Meyer L, van Horn N, Bechstein M, et al. Benefit of Intravenous Alteplase before Thrombectomy Depends on ASPECTS. Ann Neurol. 2022;92(4):588–95.

Group D, Care P. ณ โรงพยาบาลน ้ าน. 2021;16:33–45.

Chen CH, Tang SC, Chen YW, Chen CH, Tsai LK, Sung SF, et al. Effectiveness of Standard-Dose vs. Low-DoseAlteplase for Acute Ischemic Stroke Within 3–4.5 h. Front Neurol. 2022;13(February):1–10.

Barow E, Quandt F, Cheng B, Gelderblom M, Jensen M, Königsberg A, et al. Association of White Blood Cell Count With Clinical Outcome Independent of Treatment With Alteplase in Acute Ischemic Stroke. Front Neurol.

Online ISSN 3007-3197
Print ISSN 3007-3189
http://amresearchreview.com/index.php/Journal/about

2022;13(June).
Kobeissi H, Ghozy S, Turfe B, Bilgin C, Kadirvel R, Kallmes DF, et al. Tenecteplase vs. alteplase for treatment of acute ischemic stroke: A systematic review and meta-analysis of randomized trials. Front Neurol. 2023;14.
Liang H, Wang X, Quan X, Chen S, Qin B, Liang S, et al. Different doses of tenecteplase vs. alteplase for acute ischemic stroke within 4.5 hours of symptom onset: a network meta-analysis of randomized controlled trials. Front Neurol. 2023;14.
Mair G, Wardlaw JM. Normal Appearing Ischaemic Brain Tissue on CT and Outcome After Intravenous Alteplase. Front Radiol. 2022;2(June):1–7.
Okada T, Yoshimoto T, Wada S, Yoshimura S, Chiba T, Egashira S, et al. Intravenous Thrombolysis With Alteplase at 0.6 mg/kg in Patients With
Ischemic Stroke Taking Direct Oral Anticoagulants. J Am Heart Assoc.
2022;11(19).
Ma P, Zhang Y, Chang L, Li X, Diao Y, Chang H, et al. Tenecteplase vs. alteplase for the treatment of patients with acute ischemic stroke: a systematic review and meta-analysis. J Neurol [Internet]. 2022;269(10):5262–71. Available from: https://doi.org/10.1007/s00415-022-11242-4
Zhai M, Cao S, Yang J, Cao X, Dong Z, Liu W, et al. Effect of Intravenous Thrombolytic Dose of Alteplase on Long-Term Prognosis in Patients with Acute Ischemic Stroke. Neurol Ther [Internet]. 2023;12(4):1105–18. Available from: https://doi.org/10.1007/s40120-023-00488-3
Burgos AM, Saver JL. Evidence that Tenecteplase Is Noninferior to Alteplase for Acute Ischemic Stroke: Meta-Analysis of 5 Randomized Trials. Stroke. 2019;50(8):2156–62.
Bluhmki E, Danays T, Biegert G, Hacke W, Lees KR. Alteplase for Acute
Ischemic Stroke in Patients Aged >80 Years: Pooled Analyses of Individual Patient Data. Stroke. 2020;51(8):2322–31.
Zhou Y, Zhang L, Ospel J, Goyal M, McDonough R, Xing P, et al. Association of Intravenous Alteplase, Early Reperfusion, and Clinical Outcome in Patients With Large Vessel Occlusion Stroke: Post Hoc Analysis of the Randomized DIRECT-MT Trial. Stroke. 2022;53(6):1828–36.
Warach SJ, Dula AN, Milling TJ, Miller S, Allen L, Zuck ND, et al.
Prospective Observational Cohort Study of Tenecteplase Versus Alteplase in Rsoutine Clinical Practice. Stroke. 2022;53(12):3583–93.
Zhai M, Yang J, Cao X, Li Y, Xu H, Wang Y. Determinants of 1-Year Unfavorable Outcomes of Intravenous Alteplase Thrombolysis for Acute Ischemic Stroke. Clin Appl Thromb. 2023;29.
van den Berg SA, Uniken Venema SM, LeCouffe NE, Postma AA, Lycklama à Nijeholt GJ, Rinkel LA, et al. Admission blood pressure and clinical outcomes in patients with acute ischaemic stroke treated with intravenous alteplase and endovascular treatment versus endovascular treatment alone: A MR CLEANNO IV substudy. Eur Stroke J. 2023;8(3):647–54.
Potla N, Ganti L. Tenecteplase vs. alteplase for acute ischemic stroke: a systematic review. Int J Emerg Med. 2022;15(1):1–6.