ISSN (Print): 2663-9491 ISSN (Online): 2789-6897

Editorial

Intravenous thrombolysis (IV r-tPA) - a key intervention to reduce disability from acute ischaemic stroke – An editorial

DOI: dx.doi.org

HN Sarker[1]

Stroke, also known as a cerebrovascular accident (CVA), is one of the leading causes of mortality and morbidity in both developed and developing countries [1]. Currently, stroke is the third leading cause of death worldwide [2] and the most common cause of severe physical disability.

About 180–300 patients per 100 000 population presents annually with a stroke and the incidence rises steeply with age. The incidence is rising in many lower- and middle-income countries in association with less healthy lifestyles.

About 85% of stroke occurs due to cerebral infarction due to inadequate blood flow to part of the brain, and most of the remainder due to intracerebral haemorrhage.

Cerebral infarction is caused by thromboembolism secondary to atherosclerosis in the major extracranial arteries (carotid artery and aortic arch) in about 60% cases, about 20% of infarctions due to embolism from the heart, and a further 20% are due to thrombosis in situ caused by intrinsic disease of small perforating vessels (lenticulostriate arteries), producing so-called lacunar infarctions.

Cerebral infarction takes some hours to complete. Affected area consists of an infract core and surrounding potentially salvageable penumbra. The infract core results from irreversible necrosis due to occlusion of blood vessel and the 'ischaemic penumbra' is the surrounding area which suffers from hypoxia due to

(The Insight 2023; 6(1): 1-3)

1. *Professor (Ex), Medicine, Sher-E-Bangla Medical College, Barishal, Bangladesh and Sheikh Sayera Khatun Medical Collage, Gopalganj, Bangladesh*

Published: 28 November 2023
Published by:
Sheikh Sayera Khatun Medical College (SSKMC)
Gopalganj, Bangladesh

How to cite this article:
Sarker HN. Intravenous thrombolysis (IV r-tPA) - a key intervention to reduce disability from acute ischaemic stroke – An editorial . The Insight [Internet]. 2023 Nov. 28;6(01):1-3. Available from: https://bdjournals.org/index.php/insight/article/view/367

hypoperfusion and results in loss of function, but is not enough to cause permanent damage. This area of brain tissue (the so-called 'ischaemic penumbra') regains its function if the occluded blood vessel is recanalized and is the key target for modern treatment of stroke i.e. thrombolysis. The ischaemic penumbra is a dynamic process, existing even in the centre of the infarct for a short period of time before irreversible necrosis sets in and propagates to the neighbouring tissues over time, and may persist for more than 12 h after the onset of stroke symptoms.

Modern management of stroke includes rapid assessment, admission and early specialist management in a stroke unit, thrombolysis for acute ischaemic stroke (AIS), early use of aspirin in AIS and appropriate physiological monitoring. Thrombolysis for AIS is a key intervention that can reduce disability from stroke. Alteplase (IV r-tPA) within 4.5 hours of stroke onset remains the standard of care for most ischemic stroke patients. If eligible, all acute ischemic stroke patients should receive Alteplase (IV r-tPA).

Inclusion Criteria for IV r-tPA are

- Clinical diagnosis of ischemic stroke causing measurable neurologic deficit.
- Onset of symptoms <4.5 hours before beginning treatment; if the exact time of stroke onset is not known, it is defined as the last time the patient was known to be normal or at neurologic baseline.
- Age ≥18 years.

But, patient should be selected carefully by considering Exclusion Criteria which are

- Current intracranial hemorrhage
- Subarachnoid hemorrhage
- Active internal bleeding
- Recent (within 3 months) intracranial or intraspinal surgery or serious head trauma, presence of intracranial conditions that may increase the risk of bleeding (e.g., some neoplasms, arteriovenous malformations, or aneurysms)
- Bleeding diathesis
- Current severe uncontrolled hypertension.

As the timeframe is 4.5 hours after onset of symptoms (though better result is observed within 3 hours), CT scan/MRI should be done to exclude haemorrhage and some haematological test such as platelet count, PT and APTT should be advised.

Although it is desirable to know the results of these haematological tests, thrombolytic therapy should not be delayed while results are pending unless there is clinical suspicion of a bleeding abnormality or thrombocytopenia [3], the patient is currently on or has recently received anticoagulants (eg, heparin, warfarin, a direct thrombin inhibitor, or a direct factor Xa inhibitor) [4], or use of anticoagulants is not known [5]. Otherwise, treatment with intravenous tPA can be started before availability of coagulation test results but should be discontinued if the INR, PT, or aPTT exceed the limits stated in the table, or if platelet count is <100,000/ mm^3.

About 20% of stroke patients die within a month of the event and at least

half of those who survive are left with physical disability. Intravenous tPA reduces poststroke disability significantly. National Institute of Neurological Disorders and Stroke rt-PA Stroke Trial showed that patients treated with recombinant tissue plasminogen activator

(rt-PA, specifically alteplase) within 3 h of the onset of AIS were at least 30% more likely to have minimal or no disability at 3 months, with no significant change in mortality[6]. Benefits of intravenous tPA are shown in the following table.

Outcome	IV r-tPA at 0-3 hrs	No IV r-tPA
Overall outcome	43%	32%
Able to perform activities of daily living	53%	32%
No or minimal deficit 1 year after stroke	39%	26% at 3 months

It is established that Alteplase (IV r-tPA) within 4.5 hours of stroke onset has a significant role to reduce stroke disability and burden to society; but it is a great regret that IV r-tPA therapy is not available in all tertiary hospital in our country due to many reasons. Hope that it will be available soon with government and nongovernment initiatives.

REFERENCE

1. *Hamad A, Hamad A, Sokrab TE, Momeni S, Mesraoua B, Lingren A. Stroke in Qatar: a one-year, hospital-based study. Journal of Stroke and Cerebrovascular Diseases. 2001 Sep 1;10(5):236-41.*
2. *Tran J, Mirzaei M, Anderson L, Leeder SR. The epidemiology of stroke in the Middle East and North Africa. Journal of the Neurological Sciences. 2010 Aug 15;295(1-2):38-40.*
3. *Hacke W, Kaste M, Bluhmki E, et al. Thrombolysis with alteplase 3 to 4.5 hours after acute ischemic stroke. N Engl J Med 2008; 359:1317.*
4. *Del Zoppo GJ, Saver JL, Jauch EC, et al. Expansion of the time window for treatment of acute ischemic stroke with intravenous tissue plasminogen activator. A science advisory from the American Heart Association/American Stroke Association. Stroke 2009; 40:2945.*
5. *Re-examining Acute Eligibility for Thrombolysis (TREAT) Task Force:, Levine SR, Khatri P, et al. Review, historical context, and clarifications of the NINDS rt-PA stroke trials exclusion criteria: Part 1: rapidly improving stroke symptoms. Stroke 2013; 44:2500.*
6. *National Institute of Neurological Disorders and Stroke (NINDS) Study Group (1995) rt-PA Stroke Trial. N Engl J Med 333: 1581–1587 [PubMed] [Google Scholar] [Ref list]*