Thrombolysis with Tenecteplase for Basilar Artery Occlusion in Neuro and Allied Clinic: Importance of Clinical Assessment and Drip and Ship Model in Nepal

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Citation

Thapa L, Ghimire MR, Bhattarai S, Shrestha AM, Rai N, Paudel R. Thrombolysis with Tenecteplase for Basilar Artery Occlusion in Neuro and Allied Clinic: Importance of Clinical Assessment and Drip and Ship Model in Nepal. *Kathmandu Univ Med J.* 2024;85(1):120-2.

ABSTRACT

Tenecteplase, a new thrombolytic drug, is now widely recommended and used for treating acute ischemic stroke, and timely thrombolysis within 4.5 hours is crucial for better outcomes. However, due to limited stroke awareness, transportation difficulties, and inadequate access to experts and comprehensive stroke care centers, fewer than 15% of stroke patients in Nepal receive thrombolytic therapy. The "drip and ship" model, which involves starting thrombolysis at a non-comprehensive stroke care center and transferring the patient to another center for further care, can effectively overcome these obstacles, provided trained personnel are available at non-comprehensive stroke care centers. We report a case of acute ischemic stroke treated with thrombolysis within 4.5 hours of symptom onset at a non-comprehensive stroke care center, followed by transfer to another center for ongoing care, demonstrating the feasibility and potential benefits of the drip and ship model in resource-limited settings.

KEY WORDS

Basilar artery occlusion, Drip and ship model, Tenecteplase, Thrombolysis

INTRODUCTION

Acute ischemic stroke is a medical emergency that requires prompt treatment to prevent permanent neurological damage. Thrombolysis is a well-established treatment option for acute ischemic stroke within the first 4.5 hours of symptom onset.[1] However, 10-15% of patients receive this treatment that could potentially save their lives.[2,3] Tenecteplase (TNK) is a newer generation recombinant tissue plasminogen activator that is safe and effective in treating acute ischemic stroke.[4] The limited availability of experts, advanced imaging, and interventional facilities in many parts of Nepal makes diagnosing and treating stroke patients promptly challenging. In addition, a lack of awareness in public education about the signs and symptoms of stroke and the need for prompt medical attention adds to the challenges in providing timely and effective care to stroke patients in Nepal. To add more confusion, a CT scan within three hours of the onset of stroke symptoms can be normal in acute ischemic stroke.[5] Neurological assessment gives a clue to the stroke diagnosis in such a bewildering situation. Thus, there is a significant possibility for non-neurologically trained medical professionals to overlook the diagnosis, potentially leading to additional delays in initiating appropriate treatment.

Thrombolysis should ideally be given as soon as possible after the onset of symptoms and can be achieved through the drip and ship model. The drip and ship model in stroke refers to a treatment approach in which thrombolytic therapy is initiated at a primary center. The patient is then transferred to a specialized center for further management and care. The aim is to reduce treatment delays and improve outcomes by starting treatment as soon as possible, even if advanced stroke care is not immediately available at the primary center. This approach to providing acute ischemic stroke therapy increases the potential number of patients who could benefit from intravenous t-PA and can

be particularly important in regions with limited access to specialized stroke care.[6]

We report a case thrombolysed with TNK at Neuro and Allied Clinic, a non-comprehensive stroke care center in Bhairahawa, and then referred to the nearby tertiary care center for the continuation of care.

CASE REPORT

A 74-year-old man presented to Neuro and Allied Clinic within 4.5 hours of the onset of giddiness, right-sided lower motor neuron (LMN) facial palsy, slurred speech, and left-sided weakness [Modified Rankin Scale (mRS): 3/5]. He had hypertension and diabetes. He had initially visited another center within 30 mins of his symptom onset. He had done a non-contrast head computed tomography (CT) scan, which showed no evidence of intracranial hemorrhage or infarct. On arrival at our emergency, his National Institutes of Health Stroke Scale (NIHSS) score was 15, [Fig. 1 A] indicating moderate stroke severity (NIHSS ranges from 0-42, and a higher score indicates higher stroke severity). His blood pressure was 120/70 mmHg. His point-of-care blood sugar, complete blood count, renal function, liver function tests, and ECG were normal. Because of the clinical diagnosis of stroke, his CT scan image was reviewed, and hyperdense basilar artery sign (HDBAS) was noticed. Because of his symptoms and HDBAS, a diagnosis of posterior circulation stroke due to basilar artery occlusion (BAO) was made. There were no contraindications to use tenecteplase. The patient was then administered a bolus dose of tenecteplase at 0.25 mg/kg. [Fig. 1 B] He was transferred to Devdaha Medical College to continue care.

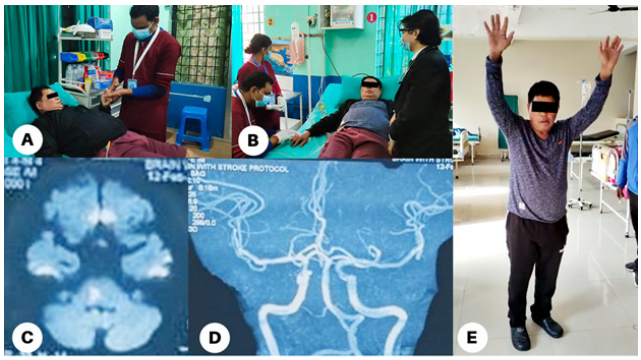

Figure 1. (A) NIHSS evaluation in emergency (B) Tenecteplase is being administered, (C) Diffusion weighted MRI showing small right paramedian pontine infarct (arrow) (D) MR Angiogram showing patent basilar artery (Arrow) and (E) 4 days after thrombolysis (at discharge NIHSS=5)

The patient was monitored closely for any adverse effects, including intracranial hemorrhage, and no significant adverse effects were noted. The patient reported remarkable improvement subjectively. Additionally, neurological assessment showed a substantial objective improvement in his speech and power within four hours of thrombolysis. This improvement indicated successful thrombolysis and recanalization of the occluded vessel. MRI Brain and angiogram obtained after 24 hours showed a small right paramedian pontine infarct on DWI and patent basilar artery [Fig. 1C and 1D]. He was discharged after four days of admission, and on discharge, his NIHSS score was 5, a remarkable 10 point reduction in his NIHSS score at presentation. [Fig. 1E] His modified Rankin scale (mRS, 0-6; 0 = normal, 6 = death) at discharge was 2, indicating good functional outcome.

DISCUSSION

This case report describes the successful thrombolysis of a stroke patient due to BAO with TNK in a non-comprehensive stroke care center in Bhairahawa, a region with limited access to stroke specialists. The patient had initially presented to another center within 30 minutes. As the diagnosis was difficult due to the presence of LMN facial palsy mimicking Bell's palsy and a normal CT scan, the patient was brought to our centre for evaluation by a neurologist. Stroke, especially in the posterior circulation, can be easily misdiagnosed in its early stages due to the non-specific and sometimes fluctuating symptoms in up to > 90% of patients, often leading to delays in the correct diagnosis.[7] Although his CT scan showed no infarct, the neurologist decided to treat the patient with thrombolysis due to HDBAS and clinical findings suggestive of BAO due to acute onset giddiness and crossed neurological signs. In patients with a high pretest probability of posterior circulation stroke, as in our case, the HDBA sign on unenhanced CT is a strong predictor of basilar artery thrombosis and both short and long-term outcomes.[8] Early diagnosis is also crucial, as BAO is associated with a high mortality and morbidity rate of 80-90% without timely detection and recanalisation.[9] The patient was treated within the 4.5 hour window.

Although reperfusion occurs in approximately 26% of cases of BAO treated with TNK, obviating the need for endovascular therapy, the patient was counseled for endovascular therapy.[10] Fortunately, the outcome with TNK in our case was positive, as evidenced by a significant reduction in NIHSS score, a patent basilar artery on MR angiogram and a good functional outcome with an mRS score of 2 at discharge.

There is no comprehensive stroke centre near our area, which is true for most of our country. Although air ambulance transfer to Kathmandu was an option, it would have taken 3-4 hours, potentially worsening the outcome due to the prolonged transfer time. In addition, air ambulance services are prohibitively expensive, deterring many patients from using them. As the patient showed significant improvement, we transferred him to a nearby tertiary care centre for further treatment. In Nepal, a country with difficult terrain, inadequate road infrastructure, a lack of ambulance services and a shortage

of trained medical personnel, the drip and ship model has several advantages for treating acute stroke patients. One of the most important advantages is the ability to rapidly administer thrombolytic therapy, which has been shown to improve patient outcomes and reduce long-term disability. We believe that early initiation of TNK therapy contributed to our patient's favorable outcome. In a study by Andrew W. Kraft and Colleagues, the rate of early recanalization was significantly higher in patients who received spoke-administered intravenous thrombolysis compared to those who did not receive this treatment at the spoke. Specifically, 12 out of 76 patients (15.8%) who received spoke-administered intravenous thrombolysis achieved early recanalization, which was a 7.2 fold increase compared to the 2 out of 91 patients (2.2%) who did not receive this treatment ($p < 0.001$).[11]

In addition, the drip and ship model can be implemented in remote and rural areas where access to specialized stroke care may be limited, thereby increasing access to prompt and effective stroke treatment. By reducing the time to treatment, the drip and ship model can potentially improve patient outcomes, as thrombolysis should be administered as soon as possible after symptom onset.

In our case, the decision to administer TNK was relatively easy as we had a highly experienced neurologist and a trained acute stroke team at the Neuro and Allied Clinic. However, it is important to note that thrombolysis is a complex treatment that requires expertise and careful consideration of risks and benefits. In regions with limited access to stroke specialists, efforts should be made to enhance access to specialist care and to ensure that healthcare providers have the necessary training and resources to make informed decisions about stroke treatment.

In conclusion, this case highlights the importance of early detection and treatment of stroke, even in regions with limited access to stroke specialists. It also underscores the importance of relying on clinical acumen, as CT scans can be normal in the early stages of stroke.[5]

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