

Posterior circulation stroke case report: Labuan Bajo's first intravenous thrombolytic

By Josua Kristiano Hilmanto



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Posterior circulation stroke case report: Labuan Bajo's first intravenous thrombolytic

Josua Kristiano Hilmanto¹, IGM Ardika Aryasa^{1,2}

¹RSU Siloam Hospitals Labuan Bajo, Manggarai Barat, Nusa Tenggara Timur, Indonesia

²RSUD Komodo Labuan Bajo, Manggarai Barat, Nusa Tenggara Timur, Indonesia

Corresponding author:

Josua Kristiano Hilmanto,

E-mail: josuakristiano@gmail.com

ABSTRACT

Background. Stroke being one of the leading causes of death and disability has lots of studies put into to alleviate risk of the outcome, intravenous thrombolysis being one of the successful discoveries. Intravenous thrombolysis has been the primarily recommended and used technique to minimize unwanted outcome. However, several limitations and risks exist, making it difficult to always succeed.

Case Report. In this article we are presenting a case of posterior circulation ischemic stroke with high pc-ASPECTS, in which its symptom went downhill compared to initial condition, then went back up only to the initial condition after the procedure

Conclusions. Despite that, we call our case a successful attempt based on NIHSS changes.

Keywords: intravenous thrombolytic; posterior stroke; pc-ASPECTS

Abbreviations:

ALT: Alanine transaminase

ASPECT: Alberta Stroke Program Early CT Score

BBB: Blood Brain Barrier

CT: Computed Tomography

EKG: Electrocardiogram

END: Early neurological deterioration

GCS: Glasgow Coma Scale

ICU: Intensive Care Unit

NIHSS: National Institutes of Health Stroke Scale

pc-ASPECT: posterior circulation-Alberta Stroke Program Early CT Score

ROS: Reactive Oxygen Species



rTPA: Recombinant ²Tissue Plasminogen Activator

INTRODUCTION

Stroke is one of the leading causes of death and disability in the world. Up until 2016, stroke was the 2nd leading cause [1]. In Indonesia, according to Sample Registration System of 2014, stroke was the number one most common disease at 21.1% [2]. Among all stroke occurrences, it was estimated that 85% are ischemic [3]. Since its discovery in early 1990 and its acknowledgement in 1996, recombinant tissue plasminogen activator has been the recommended thrombolytic agent for intravenous thrombolysis. However, there are still so many patients unfit to have its benefit because of its short time period of work since stroke's onset and its criteria [4,5]. Furthermore, even after having intravenous thrombolysis, several patients did not experience improvement. Instead, it was reported that aside from 32% of patients not having any improvement, 15% of patients had worse NIHSS score [6]. In this article, we are presenting a case of acute ischemic stroke in which the first intravenous thrombolysis in Labuan Bajo, East Nusa Tenggara, was done.

⁵CASE REPORT

A 46-year-old male presented to our emergency department with sudden weakness of his right limbs about 30 minutes prior to admission. Symptom accompanied by headache and slurred and nasal speech, without projectile vomiting. Patient had a history of hypertension and hypercholesterolemia, but no diabetes. Three weeks prior to current symptoms, patient had similar symptom of weakness on his right limbs for less than 24 hours. Patient had been taking 80mg acetylsalicylic acid once daily since.

On admission, patient was fully alert. Physical exam showed normal findings on general state. Neurological exam showed hemiplegia on right limbs, paresis of 7th and 12th left supranuclear cranial nerve. Head CT scan was ordered early but was delayed because of patient's insurance trouble. Despite the delay, code stroke team was called and was ready. EKG was normal. Chest x-ray showed cardiomegaly. Blood work was done. Serum creatinine and ALT are the only items with abnormal findings. Serum creatinine was 1.50 (0.67 - 1.17), ALT was 52 (\leq 41).

Admission blood glucose was 120.

During the approximate 2-hour delay, patient's condition deteriorated. GCS dropped to 10, not so long after, dropped further to 6. Patient was short of breath and drooling. Family decided to proceed with hospital's procedure without insurance.

Head CT scan was done with an pc-ASPECT score of 8. No sign of intracranial bleeding was found. Code stroke team proceeded with alteplase iv infusion of 6.7 milligrams for 1 minute,



continued by 60.8 milligrams using syringe pump for 60 minutes. NIHSS before the procedure was 19.



(Figure 1). Axial section Head CT pre-thrombolysis.

Patient's consciousness level rose 4 hours post thrombolysis procedure. NIHSS was reduced from 19 to 12. Patient had eye contact with the examiner, performed commands for blinking eyes and squeezing hands, but communication was still difficult as he's confused and having difficulty breathing despite being on high flow oxygen. Lateralization and Babinski reflex were still found positive. During the night, 12 hours after the procedure, patient's peripheral oxygen level dropped and was intubated. There was no sign of increased intracranial pressure nor bleeding.

The next day follow-up, it was found that the patient still had 7th and 12th cranial nerve paresis and positive Babinski signs. His motor function was improved from 0 to +1. No sign of increased intracranial pressure, dyspnea, nor drooling. NIHSS after the procedure was 12. Follow-up head CT scan showed pons infarct. Patient was transferred to Regional General hospital due to insurance problems and admitted to the ICU. During hospital admission, patient suffered from ventilator acquired pneumonia and was discharged after 7 days of antibiotic, resulting in a total of 10 days of hospitalization. Patient still had dysphagia and was discharged with nasogastric tube.



(Figure 2). Axial section Head CT post-thrombolysis.



DISCUSSION

Intravenous thrombolysis

Intravenous thrombolysis, according to guideline, is still the standard treatment of choice of acute ischemic stroke, especially where mechanical thrombectomy is not available [5]. Furthermore, previous data implied that in posterior circulation ischemic stroke, even when mechanical thrombectomy is available, patients had better outcome with thrombolysis before thrombectomy. It is found that directly applying mechanical thrombectomy without previously applying intravenous thrombolysis resulted in worst outcome. The said observational multicenter cohort study found that patients having thrombolysis alone had no difference in three-month functional outcome compared to thrombolysis and thrombectomy. One of the reasons being thrombectomy gave better early outcome yet it also led to complications such as hemorrhage and mortality, especially in smaller vessel occlusion [7].

We gave our patient alteplase as it is intended in the guideline, which is 0.9 milligrams for every kilogram of bodyweight, 1 minute bolus of 10% total dose, continued by 60 minutes of the rest of calculated dose. Despite the delay, we still managed to start treatment within effective time period, that is below 3 hours, or up to below 4.5 hours [8]. Intravenous thrombolysis can be called success if there is an improvement of at least 4 points on NIHSS or neurological improvement within 24 hours [9]. Our patient not only had decrease of NIHSS by 7 points, but also had better presentation after the thrombolytic.

ASPECT score

ASPECTS, short for **10** Alberta Stroke Program Early CT Score, is a score used to predict prognosis of patient's functional outcome after 3 months, and also clinical outcome of recanalization effort, such as intravenous thrombolysis and mechanical thrombectomy. ASPECT score is calculated by taking out sum of affected area of the brain off 10. Areas counted in ASPECT score are caudate, internal capsule, putamen, insula, and cortexes supplied by medial cerebral artery, split into M1 through M6. There is a variant of ASPECT score for posterior circulation, shortened pc-ASPECTS, which calculation is done using different areas of the brain. Those areas are two occipital lobes, two cerebellar hemispheres, both thalamus, both side of pons and mesencephalon. In either scoring system, a score of less than 8 usually gives out worse functional outcome, and worse outcome with thrombolysis [10]. Our patient having ASPECTS of 8 theoretically should have good outcome with thrombolysis. The patient having otherwise result calls for an explanation.

Posterior circulation stroke

Posterior circulation ischemic stroke is the less frequent variant of ischemic stroke. It is said that posterior circulation ischemic stroke happens 20-25% of all ischemic stroke [11]. Posterior



circulation ischemic stroke, as its name implies, in the posterior circulation, which include vertebral artery, basilar artery, both inferior cerebellar artery, basilar artery, superior cerebellar artery, and lastly posterior cerebral artery. These arteries supply blood into brainstem, cerebellum, thalamus, medial temporal lobe, and visual and auditory cortex. Hence the variability of neurologic deficit that shows when posterior circulation ischemic stroke is the case. Some of the first complaints include dizziness, dysarthria, blurry vision, unilateral limb weakness, headache, nausea, and vomiting. Babinski sign, cranial nerve 3 and 7 abnormalities, respiratory and cardiovascular abnormalities can also be found. Reduced sensory on one side of the face and another side of the body is another sign of posterior circulation ischemic stroke. Sometimes, locked-in syndrome can happen [12]. Affected vertebral artery can cause decreased level of consciousness, paralysis of facial nerve, and bulbar palsy, which includes dysphonia, dysarthria, and dysphagia, which we can find on our patient [13]. The outcome of posterior circulation ischemic stroke is said to be better than anterior circulation, unless the affected artery is vertebrobasilar, in which the 3-month post thrombolysis mortality is significantly higher than those of anterior circulation ischemic stroke [14].

rtPA's side effect

Alteplase's first action after administered is being an endogenous thrombolytic enzyme, but then if it crosses blood-brain barrier into cerebral parenchyma it could cause neurotoxicity, edema, and even hemorrhagic transformation [15]. After thrombus get dissolved and arteries' blockage are freed, also known as recanalization, reperfusion doesn't always happen. De Silva et al reported that of 13 patients undergoing thrombolysis and recanalization, 4 didn't achieve reperfusion [16]. Theories proposed behind these events are mainly about reperfusion injury caused by overproduction of reactive oxygen species (ROS). Overproduced ROS overwhelms antioxidant scavenging activity causing several injuries through pericyte contraction, apoptosis, and endothelial and BBB injury followed by platelet activation, inflammatory response including complement and cytokines activation, and microvascular thrombosis [17].

Early neurological deterioration, abbreviated END, is defined by worsening of ischemic stroke noted by increase of at least 4 points in NIHSS observed between admission and 24 hours post thrombolytic [18]. Risk or predictive factors of this worsening condition include atrial fibrillation, history of cerebral infarct, nondiabetic hyperglycemia on admission, high ALT level, and intracerebral hemorrhage post-alteplase. Surprisingly, hypertension, hyperlipidemia, and history of smoking are found to be not increasing the risk of END [19,20]. Our patient only has one of these factors which is increased ALT level. Mengzhi Jin et al found that every 1 U/L increase of ALT level increases END risk by 1.05-fold. Theory behind this finding is proposed to



be the prolonged half-life of alteplase causing extended effects as it is mainly metabolized in the liver and elevated transaminase level might affect it [19].

CONCLUSION

We presented a case of acute less common posterior circulation ischemic which went down within 3 hours of onset. We did our first intravenous thrombolytic which resulted in a success, noted by both improvement in NIHSS and neurological presentation, even though the patient's initial complaint of unilateral weakness wasn't cured completely.

Patient consent

The patient's family agreed that the case is published for study with a note that the patient's identity is not published

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Conflict of interest

We declare no conflict of interest in the making of this manuscript.

Author's contributions

Author 1: writing—original draft preparation and editing

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Author 2: conceptualization, writing and elaboration of discussion, review, supervision

All authors have read and agreed to the published version of the manuscript

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