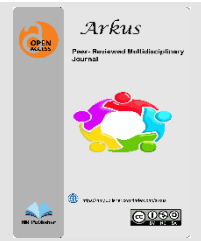




ARKUS

Journal Homepage:

<https://hmpublisher.com/index.php/arkus>



Mechanical Thrombectomy as the Treatment of Choice for Ischemic Stroke Large Vessel Acocclusion

Pinto Desti Ramadhoni^{1*}

¹ Department of Neurology, Faculty of Medicine, Sriwijaya University, Palembang, Indonesia

ARTICLE INFO

Keywords:

Thrombectomy
Stroke
Occlusion

Corresponding author:

Pinto Desti Ramadhoni

E-mail address:

pinto_dr@gmail.com

The author has reviewed and approved the final version of the manuscript.

<https://doi.org/10.37275/arkus.v4i1.122>

ABSTRACT

Even though there have been great advances in the field of stroke management in 2 In the last decade, stroke is still the leading cause of disability and death worldwide. Current ischemic stroke therapy aims to improve long-term outcomes in stroke patients. For this purpose, early recanalization is the only promising therapy for acute ischemic stroke. The main goal of reperfusion therapy in acute ischemic stroke is to immediately improve blood flow (recanalization) in areas of the brain that are ischemic and have not undergone infarction. The long-term goal is to increase outcomes by reducing disability and death from stroke. The most important factor in the success of reperfusion therapy in acute ischemic stroke is therapy as early as possible. However, selection of suitable candidates for reperfusion therapy requires neurologic evaluation and neuroimaging studies.

1. Introduction

Despite major advances in stroke management in the last 2 decades, stroke is still the leading cause of disability and death worldwide. Current ischemic stroke therapy aims to improve long-term outcomes in stroke patients. For this purpose, early recanalization is the only promising therapy for acute ischemic stroke. ¹ The main goal of reperfusion therapy in acute ischemic stroke is immediately improve blood flow (recanalization) in ischemic brain regions and not infarcted. The long-term goal is to increase outcomes by reducing disability and death from stroke. The most important factor in the success of reperfusion therapy in acute ischemic stroke is therapy as early as possible. However, selection of

suitable candidates for reperfusion therapy requires neurologic evaluation and neuroimaging studies.

Thrombolytics

Administration of intravenous thrombolysis (recombine tissue Plasminogen Activator intravenous / Alteplase) has been the main recommendation from the Food and Drug Administration (FDA) since 1996 in acute ischemic stroke, with administration time of less than 4.5 hours after onset. ³ Because the benefits of intravenous thrombolytic therapy are highly dependent on the timing of administration, it is important to initiate therapy as soon as possible.¹ But unfortunately in Indonesia most patients come to



<https://hmpublisher.com/index.php/arkus>

the health center/hospital after 6 hours from onset, so that intravenous thrombolysis therapy cannot be given. mechanoaspiration. Recent advances in the field of endovascular therapy using “stentriever” have demonstrated the effectiveness of recanalization in occlusion of intracranial vessels and improve clinical outcome.² Thrombolysis with IV and IA administration of rtPA has been shown to be effective and improve neurological status when compared with placebo. However, both methods have limitations. First, the therapeutic window for treatment until recanalization occurs is relatively narrow. Second, administration of drugs for thrombolysis may increase the risk of intracerebral hemorrhage. Third, the success of recanalization depends on the location of the vessel occlusion; Proximal large vessel occlusions such as the supraclinoid segment or the internal carotid artery/intracranial internal carotid artery (ICA) or the M1 segment of the medial carotid artery (MCA) have limited recanalization with IA thrombolysis and particularly IV thrombolysis. On the basis of these limitations, various other mechanisms were started to remove the occlusion, such as the aspiration system, devices for withdrawing/removing foreign bodies, and stent retrieval. These are known as mechanical thrombectomy. Mechanical thrombectomy can restore 41-54% of perfusion of the blood vessels. Mechanical thrombectomy is considered to increase the rate of recanalization and reduce the incidence of symptomatic bleeding. The mechanical stroke therapy approach is also aimed at reperfusion quickly and efficiently with a short procedure time but has a wider therapeutic window. 3 Endovascular thrombectomy for large vessel ischemic stroke has been shown in a recent trial to be the single most effective stroke treatment of all therapies. There were 5 (five) supportive trials published in 2015, and this has prompted changes to guidelines for management in the United States, Europe, and Canada and many other countries have joined the process of updating

their recommendations. MR-CLEAN (Multicenter Randomized Clinical Trial of Endovascular treatment for AIS in the Netherlands) using stent retrieval in 97% of cases, demonstrated the benefit of endovascular therapy in patients with proximal anterior circulation stroke with onset of more than 6 hours. ESCAPE (Endovascular Treatment for Small Core and Anterior Circulation Proximal Occlusion with Emphasis on Minimizing CT to Recanalizaion Times), this trial was terminated prematurely after 316 patients were randomly selected due to positive initial analysis results. EXTEND-IA (Extending the Time for Thrombolysis in Emergency Neurlogical Deficits-Intra-Arterial), was also discontinued early due to positive results in which phase 2 studies showed rapid reperfusion and neurological improvement within 3 days. SWIFT-PRIME (Solitaire With the Intention For Thrombectomy as Primary Treatment for acute Ischemic stroke), was also discontinued early after positive results in 196 patients. REVASCAT (Randomized Trial of Revascularization with Solitaire FR Device versus Best Medical Therapy in the Treatment of Acute stroke due to Anterior Circulation Large Vessel Occlusion Presenting within Eight hours of symptom onset), patient collection was stopped early after publication of positive results from other studies . 6,7 There were previously three trials published in 2013, evaluating endovascular therapy, namely IMS III (Interventional Management of Stroke-III), MR RESCUE (Mechanical Retrieval and Racanalization of Stroke Clots Using Embolectomy) and SYNTHESIS (a Randomized Controlled Trial). on Intra-Arterial Versus Intravenous Thrombolysis in Acute Ischemic Stroke), which reported a neutral outcome on clinical outcome. The explanation for the failure of endovascular therapy to show its superiority is due to the long delay between symptom onset and treatment, inadequate patient selection, and use of older generation devices. STI III showed no difference in safety and clinical outcome compared with IV



thrombolysis, but most importantly, STI III demonstrated that delay in reperfusion was associated with a possibly poorer clinical outcome. 7 The first FDA-approved thrombectomy was MERCITM in 2004, and has been tested in mechanical embolus removal in cerebral ischemia (MERC trial) in 151 subjects with anterior (90%) and posterior (10%) large vessel occlusions. and 8 hours of onset. Recanalization occurred in 46% of patients and improvement in neurological status occurred in 27.7% of patients. This study showed good clinical improvement in patients who underwent recanalization compared to patients who did not undergo recanalization. However, in its development, the most widely used thrombectomy method is the Solitaire FRTM stent retrieve. The stent retriever can inflate itself without using a balloon (self expandable) and can be inserted back into the catheter (re-sheathable). Thrombectomy using a stent retriever is a new therapeutic approach in acute ischemic stroke. The concept of a stent retriever is to combine the benefits of intracranial stent placement and rapid flow restoration with mechanical thrombectomy that can remove the cloth (clot) in the blocked artery. The 3 DAWN trial demonstrated that, in patients with stroke due to occlusion of the intracranial carotid artery or the proximal cerebral artery, the latter was known to be healthy 6 to 24 hours previously and who had a clinical mismatch between the clinical deficit findings and infarct volume; found that the outcome for disability and functional independence within 90 days was better with thrombectomy with standard medical care than with standard medical care alone. 5,8 Improvement in disability within 90 days of treatment occurred in 1 out of every 2 patients who were thrombectomy and improvements in functional independence occurred in 1 out of every 2.8 patients. The benefit of this thrombectomy was consistently seen in all subgroups based on age, stroke severity, site of occlusion, and time of treatment. 8

2. Conclusions

The main goal of reperfusion therapy in acute ischemic stroke is to immediately improve blood flow (recanalization) in areas of the brain that are ischemic and have not undergone infarction. The long-term goal is to increase outcomes by reducing disability and death from stroke. The most important factor in the success of reperfusion therapy in acute ischemic stroke is therapy as early as possible. However, selection of suitable candidates for reperfusion therapy requires neurologic evaluation and neuroimaging studies.

3. References

1. Jacquin GJ, Van Adel BA. Treatment of acute ischemic stroke : from fibrinolysis to neurointervention. *Journal of Thrombosis and Haemostasis*. 2015; 13 (suppl.1): S290-S6.
2. Filho JO, Samuels OB. Approach of reperfusion therapy of acute ischemic stroke (internet), Uptodate, 2018. <http://www.uptodate.com>
3. Usman FS. Neurointervensi ; Penatalaksanaan stroke iskemik fase akut terkini (Ulasan singkat studi MR.CLEAN, ESCAPE, EXTEND-IA DAN SWIFT PRIME) (Tinjauan Pustaka). Jakarta : SMF Neurologi RSUP Fatmawati. *Neurona*. 33. 2016.
4. Registri Stroke Indonesia 2012-2014, Pusat Teknologi Terapan Kesehatan dan Epidemiologi Klinik, www.ina.registry.org, 2014
5. Bhaskar S. Stanwell P. Cordato D. Attia J. Levi C. Reperfusion therapy in acute ischemic stroke: dan o a new era?. *BMC Neurology*, 2018; 18-8.
6. Campbell BCV. Donnan GA. Mitchell PJ. Davis SM. Endovascular thrombectomy or stroke: current best practice and future



- goals. Stroke and Vascular Neurology. 2016; 1: e000004
7. Nogueira RG, et all. Thrombectomy 6 to 24 hours after stroke with a mismatch between deficit and infarct. The New England Journal of Medicine. 2018; 178.
 8. Wahlgren N. et all. Mechanical thrombectomy in acute ischemic stroke; Consensus statement by ESO-Karolinska stroke update 2014/2015, Journal of stroke. 2016; 11(1): 134-147

