

**Case Report**

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# For Better Evaluation and Treatment of Stroke Patients: A Case Study



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## Abstract

Recent updates in acute ischemic stroke guidelines had widened the time window for mechanical thrombectomy from 6 to 24 hours from onset of symptoms. These changes require novel approaches in the emergency department protocols. The emergency department, neurology department and interventional neuro-radiology unit of Rambam healthcare campus have developed an innovative practice for expedited treatment. Guidelines state that mechanical thrombectomy will be considered for patients presenting with severe clinical presentation and minimal tissue damage, namely, clinical deficit and infarct size mismatch, including wake-up stroke patients.

In this case study we present a 65-year-old patient with a vast medical history, presenting with a wake-up stroke, unknown onset time of symptoms and national institute health stroke scale score of 13 who underwent a successful mechanical thrombectomy treatment. The innovative protocol enabled this patient to return to his previous high functioning state. This case report demonstrates the importance of recent guidelines and their implementation in the clinical practice. The clinical challenge of treating late arrival patients with the same devotion of early arrival patients might be resolved with the implementation of an innovative protocol. Future studies are needed to corroborate the effectiveness of this protocol in a large sample.

**Keywords:** CVA; Endovascular treatment; Fast track; Mechanical thrombectomy; Stroke; Wake up stroke

## Introduction

Stroke is one of the most significant health problems in the western world. Approximately 780,000 strokes occur each year in the US alone must [1]. Furthermore, stroke is the third leading cause of death and the leading cause of serious long-term disability [2]. It is well established that treatment be initiated as fast as possible and outcome is significantly better if recanalization of the artery is achieved in the first 120 minutes from symptoms onset [3,7]. Diagnosis is being done clinically by trained neurologists using the National Institute of Health Stroke Scale (NIHSS) which is the recommended scale to use, followed by CT scan [2]. The intervention consists of Endovascular Treatment (EVT) and in this case the data is changing rapidly and dramatically in the last 3 years. Five recent Randomized Controlled Trials (RCTs) have established in 2015 a clinical benefit of EVT for appropriate patients with acute cerebral artery occlusion in the anterior circulation [7].

A meta-analysis of these RCTs, the Highly Effective Reperfusion evaluated in Multiple Endovascular Stroke Trials (HERMES) study, has shown a consistent benefit of EVT over standard medical treatment [3]. The results of the recently reported DAWN trial showed that the time window for endovascular treatment may be

extended to 24 hours after the patient was last known to be well if patients are carefully selected on the basis of a disproportionately severe clinical deficit in comparison with the size of the stroke on imaging [4,5]. The diffuse-3 trial that followed it shortly showed that endovascular thrombectomy for ischemic stroke 6 to 16 hours after a patient was last known to be well plus standard medical therapy resulted in better functional outcomes than standard medical therapy [6].

Following those trials, the time window for treatment was expanded to 24 hours for patients that underwent stroke imaging and were found eligible [7]. The immediate outcome of those guidelines was an overwhelming number of patients brought into the Emergency Department (ED) with suspected acute stroke that must be treated in the new time window. This state of affairs led the ED, neurology department and the Interventional Neuro-Radiology (INR) unit to reorganize and revise the clinical protocol for late onset Acute Ischemic Stroke Patients (AIS).

## Case Report

This is a 65-year-old male, with a medical history of hypertension, Insulin-dependent diabetes mellitus, atrial fibrillation treat-

ment with Xarelto, hypertrophic non-obstructive cardiomyopathy, chronic renal failure and congestive heart failure. At 23:00pm the patient woke up confused, fell and hit his head without loss of consciousness. At 5:00am in the morning the patient arrived at a local secondary hospital and underwent medical examination by a neurologist. The NIHSS score was 12 and a non-contrast CT (NCCT) scan and CT angiography (CTA) were performed. A hyperdense lesion was found in the right Middle Cerebral Artery (MCA) and distal M1 occlusion by thrombus was observed in the CTA. The Alberta Stroke Program Early CT Score (ASPECT) was 10. The team at the hospital consulted us on-call INR specialist and it was decided to transfer the patient by emergency medical service to our tertiary hospital (Rambam healthcare campus), where mechanical thrombectomy is executed. During the transfer the patient's clinical condition worsened with development of speech disorder and weakness in the left hand (NIHSS 13).

### Results

The patient arrived at our hospital at 7am and began a fast track protocol. Upon arrival a CT, CTA and CT Perfusion (CTP) was performed. In the right MCA territory, a low Cerebral Blood Flow (CBF) and high TTP/MTT values were observed without a matching decrease in Cerebral Blood Volume (CBV). A cut-off of right M1 was noted as well. These results indicated an acute infarct with a large penumbra (90%). It was decided to perform a mechanical thrombectomy. The procedure was uneventful with thrombus extraction within one attempt and Thrombolysis in Cerebral Infarction (TICI) score of 3. The patient was hospitalized for 5 days and released to his home with a modified Rankin scale of 1. NCCT at day 3 post procedural showed no visible infarct.

### Discussion

Time to treatment remains the most important factor in acute ischemic stroke prognosis [8]. Nonetheless, a solution for late arrival patients in the form of a new protocol should be implemented [7]. This new challenge had led the ED, neurology department and the INR unit to reorganize and revise the clinical protocols for late onset Acute Ischemic Stroke Patients (AIS). In the present case study, we demonstrated a potential mode of operation that ascertains the importance of innovative protocol implementation in the onset of new multinational guidelines. As opposed to previous protocol, we now include all potentially eligible patients, regardless of age, co-morbidities, or transfer time. Furthermore, it is a demonstration of our combined efforts,

with our colleagues in secondary centers and within our own institute and the potential excellent treatment outcomes of the Rambam protocol. This new protocol has changed dramatically the number of patients treated in more than 100% in less than 2 years.

### Conclusion

In this research we present a unique case in which a patient with a variety of comorbidities, who was past the intervention time window and was even transferred from another hospital. More so, he arrived with a wake-up stroke. A year ago, he would be left untreated. Today, he was treated and was even categorized upon his release as high-functioning. This case presents two important challenges ahead. The first is accurate diagnosis of AIS patients in an era of increase in target population and time window expansion. The second is the ability of the combined teams to address early onset and late arrivals equally.

### Conflict of Interest

None

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