Mechanical Thrombectomy in Acute Ischemic Stroke: Initial Single-Center Experience and Comparison with Randomized Controlled Trials

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Background: Until recently, intravenous thrombolysis was the only reperfusion therapy with proven efficacy in patients with acute ischemic stroke. However, this treatment option has low recanalization rates in large-vessel occlusions. The search for additional treatments continued until 5 randomized trials (MR CLEAN, ESCAPE, EXTEND-IA, SWIFT PRIME, and REVASCAT) revealed the superiority of mechanical thrombectomy for anterior circulation large-vessel occlusion. After 1 year of performing thrombectomy with stent retrievers in our tertiary hospital, we intended to answer the question: is it possible to achieve similar results in a "real-world" setting? *Methods:* We analyzed data from our prospective observational registry, compared it with the trials aforementioned, and concluded that the answer is affirmative. *Results:* Our study population of 77 patients, with a mean age of 68,2 years and 48,1% men, is comparable with these trials in much of selection criteria, baseline characteristics, and rate of previous intravenous thrombolysis (72,7%). Recovery of functional independence at 90 days was achieved in almost two thirds of patients, similarly to the referred trials. We devoted special emphasis on fast recanalization, keeping a simple image selection protocol (based on non-enhanced and computed tomography angiography) and not waiting for clinical response to thrombolysis in patients eligible for mechanical thrombectomy. We emphasize a successful recanalization rate of 87% and only 2,6% symptomatic intracranial hemorrhage. *Conclusion:* In summary, mechanical thrombectomy seems to be a safe and effective treatment option in a "*real-world*" scenario, with results similar to those of the recent randomized controlled trials. **Key Words:** Acute ischemic stroke—endovascular treatment—mechanical thrombectomy—stent retrievers.

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Introduction

Until recently, intravenous (IV) thrombolysis was the only reperfusion therapy with proven efficacy in patients with acute ischemic stroke. Among many limitations, this treatment has low efficacy rates in the recanalization of large-vessel occlusions, which account for a significant percentage and simultaneously more severe cases of acute ischemic stroke.[1]

In 2015, 5 prospective, randomized, open-label clinical trials (MR CLEAN,[2] ESCAPE,[3] EXTEND-IA,[4] SWIFT PRIME,[5] and REVASCAT[6]), demonstrated the superiority of mechanical thrombectomy over best medical treatment (including, whenever possible, IV thrombolysis), in patients with anterior circulation large-vessel occlusion. All of these trials were multicenter studies, with selective inclusion and exclusion criteria and homogeneous populations. Despite some protocol differences, eligible patients had an anterior circulation large artery occlusion (distal internal carotid artery [ICA] or M1 segment of middle cerebral artery [MCA]), accompanied by important neurological deficits (using National Institutes of Health Stroke Scale [NIHSS][7]) and a small infarct core (using Alberta Stroke Program Early CT Score [ASPECTS][8]); new generation devices (stent retrievers) were used in all cases. All authors emphasized protocols complexity, including the need of multidisciplinary teams; thus, stroke centers are faced with the need of a high level of organization, trying to achieve times to reperfusion as low as possible.

After divulgation of the consensus statement on mechanical thrombectomy in acute ischemic stroke by the European Stroke Organisation,[9] our tertiary hospital started to provide this treatment option on a 24/7 basis. One year later, the purpose was to look at our results, compare them with those of the randomized controlled trials, and try to answer to a pragmatic question: is it possible to achieve similar results in a "*real-world*" setting?

Methods

Our tertiary center has an area of direct influence of 335,000 inhabitants and responds to various hospitals in the north of Portugal. With regard to endovascular treatment of acute ischemic stroke, it is the reference center to a total of approximately 1.7 million inhabitants.[10]

The analysis is based on a prospective observational registry of all consecutive patients who were treated with mechanical thrombectomy, between February 2015 and February 2016, for ischemic stroke due to anterior circulation large-vessel occlusion (intracranial ICA, M1 or proximal M2 segments of MCA, including *tandem* occlusions). Neurovascular thrombectomy was performed exclusively with the use of the Trevo (Stryker, Kalamazoo, MI) device. Patients were eligible for concomitant IV thrombolysis according to European Stroke Organisation guidelines,[11] without delays in the initiation of mechanical thrombectomy.

There was no upper age limit, and patients had to be previously autonomous (modified Rankin Scale[12] [mRs] <2); all patients had a standard non-enhanced cranial computed tomography (CT) without prominent early ischemic changes (ASPECTS >5) and a CT angiography to document large-vessel occlusion. Treatment decisions were shared between a vascular neurologist and an interventional neuroradiologist, who reviewed all images before performing the endovascular treatment. All patients were subsequently admitted to the stroke unit or, when required, to the intensive care unit.

In acute *tandem* occlusions, whenever possible, emergent stenting of extracranial ICA in combination with mechanical thrombectomy was conducted; a retrograde approach (stent after thrombectomy) was used in all cases. Immediately before stent placement, patients received an IV bolus of aspirin (1000 mg) and an additional IV bolus of heparin (5000 IU) if not previously treated with IV thrombolysis. Immediately after procedure, a CT scan was performed to rule out intracranial hemorrhage; if so, patients received a loading dose of clopidogrel (600 mg). Aspirin (100 mg/day) and clopidogrel (75 mg/day) were maintained for 1 month and then switched to monotherapy with life-long aspirin (100 mg/day).

The collected data comprised baseline characteristics, interventional procedure data, and outcome and safety parameters. These included demographics (age, sex), clinical presentation (NIHSS), and pre-stroke disability (assessed by mRS); extent of early ischemic changes and initial imaging documenting site of large-vessel occlusion; time between symptoms onset and start of treatment, procedural time intervals; result of recanalization (modified thrombolysis in cerebral infarction [mTICI][13]); peri- and posttreatment complications (hemorrhagic and local events); and mortality and disability at follow-up (mRS at 90 days) as assessed presentially to all patients by a trained member of the neurovascular outpatient clinic. Parenchymal hemorrhages were classified according to the European Cooperative Acute Stroke Study.[14] Successful recanalization was defined as mTICI >2a, and favorable clinical result was set as mRS at 90 days <3.

Results

During the study period, 91 patients were treated with mechanical thrombectomy, 77 of them due to anterior circulation large-vessel occlusion. Baseline characteristics like percentage of male patients, initial NIHSS and ASPECTS scores, and proportion of patients previously submitted to IV thrombolysis were very similar to randomized trials populations (Table 1); almost a quarter (24,6%) of patients were ≥80 years old (33-88 years). In 7 patients, symptoms to groin puncture interval was >6 hours.