Mechanical Thrombectomy for Acute Ischemic Stroke Patients Aged 80 Years or Older

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Background: There are limited data about the prognostic factors predicting outcomes after mechanical thrombectomy with stent retrievers for the elderly. Here, we evaluated outcomes in elderly patients in a real-world setting. *Methods:* Between April 2015 and January 2017, 80 patients with anterior intracranial acute large vessel occlusion, who had lived independently before ictus, were treated with mechanical thrombectomy using a stent retriever at our institute. We compared outcomes between patients ≥80 years old (n = 36) and those <80 years old (n = 44), and assessed prognostic factors for favorable outcomes (modified Rankin Scale score 0-2) at 90 days in all patients. *Results:* There was no significant difference in baseline National Institutes of Health Stroke Scale score and Alberta Stroke Program Early Computed Tomography Score between the 2 groups. Successful revascularization (modified Thrombolysis in Cerebral Infarction [mTICI] scores 2b/3) (83% versus 93%, *P* = .286), complete recanalization (mTICI 3) (47% versus 50%, *P* = .826), and favorable outcomes (42% versus 57%, *P* = .261) were achieved more often in those <80 years old, but differences did not reach statistical significance. Multivariate regression analysis showed that baseline National Institutes of Health Stroke Scale (*P* = .013) and mTICI scores of 3 (*P* = .006) were significant predictive factors, but being ≥80 years old and baseline Alberta Stroke Program Early Computed Tomography Score were not. In those ≥80 years old, mTICI score of 3 was an influential factor for favorable outcome (*P* = .017). *Conclusions:* Being aged 80 years or older was not a significant predictor for outcomes after mechanical thrombectomy, whereas complete recanalization was an influential predictor of outcome in the elderly. **Key Words:** Acute ischemic stroke—endovascular treatment—mechanical thrombectomy—elderly.
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Introduction

Five recent randomized controlled trials (RCTs) have established a clinical benefit of mechanical thrombectomy for appropriate patients with acute cerebral artery occlusion in the anterior circulation.[1-5] A meta-analysis of these RCTs, the Highly Effective Reperfusion evaluated in Multiple Endovascular Stroke Trials (HERMES) study, has shown a consistent benefit of mechanical thrombectomy over standard medical treatment, even in elderly patients, including those older than 80 years.[6]

However, despite the benefits of treatment with mechanical thrombectomy, age was reported as a strong independent negative predictor of outcome after treatment in this meta-analysis. Although this age-related disadvantage may mainly be associated with older age itself, other factors associated with technical matters have not been fully investigated. In particular, this relationship has not been investigated in current clinical settings, in which successful revascularization can be achieved with considerably high rates with mechanical thrombectomy using stent retrievers.

Here, we assess predictive factors for clinical outcome after mechanical thrombectomy by analyzing cases we have treated, including very elderly patients in Japan.

Materials and Methods

Patient Selection

We retrospectively reviewed 91 consecutive patients with anterior intracranial acute cerebral artery occlusion treated with mechanical thrombectomy at our hospital, between April 2015 and January 2017. To clarify the effects of mechanical thrombectomy, we excluded patients with a modified Rankin Scale (mRS) over 3 (n = 10) before ictus and who required carotid artery stenting (n = 1). Accordingly, participants selected for analysis in this study comprised 80 patients who had lived independently (mRS score of ≤2) before stroke onset.

Our selection criteria for patients receiving mechanical thrombectomy included any neurologic deficit, who were <8 hours from symptom onset or <24 hours from the time the patient was last seen to be well when the time of symptom onset was unknown. There were no restrictions on age. After admission, both computed tomography and magnetic resonance imaging were conducted. The target vessels included the intracranial internal cerebral artery (ICA) and the M1 and M2 portions of the middle cerebral artery were confirmed with magnetic resonance angiography.

Patients with a score of ≥6 on the Alberta Stroke Program Early Computed Tomography Score (ASPECTS) and on ASPECTS-diffusion weighted imaging were candidates for mechanical thrombectomy. Intravenous tissue plasminogen activator (IV tPA) was administered after magnetic resonance imaging according to the Japanese Guidelines for the Management of Stroke.[7] In cases treated with IV tPA, mechanical thrombectomy was performed if a subsequent diagnostic angiography did not show successful recanalization.

Informed consent was obtained from each patient or family member before performing the endovascular procedure.

Endovascular Procedures

Our endovascular procedures for mechanical thrombectomy have been previously reported.[8] All procedures were performed with minimal conscious sedation (dexmedetomidine or pentazocine). An intravenous heparin bolus (2000-5000 U) was given after groin puncture and a 9 French balloon guide catheter was navigated into the ICA via transfemoral access. We navigated a Trevo Pro18MC microcatheter with a Transend-EX ST microguidewire (both from Stryker, Kalamazoo, MI) into the portion distal to the occluded site crossing the clot. The Trevo ProVue and XP ProVue stent retriever (Stryker) were used as the first-line device for mechanical thrombectomy. If a maximum of 3 passes of the Trevo device failed to revascularize the vessel, we attempted additional endovascular procedures, including percutaneous transluminal angioplasty, aspiration by Penumbra catheter (Penumbra Inc., Alameda, CA), and intra-arterial thrombolysis using urokinase.

Outcome Assessment

Successful recanalization and complete recanalization were defined as a modified Thrombolysis in Cerebral Infarction (mTICI) score of 2b/3 and an mTICI score of 3, respectively. A favorable outcome was defined as an mRS score of ≤2 at 90 days. Symptomatic intracranial hemorrhage was defined as subarachnoid hemorrhage or intracerebral hemorrhage combined with an increased National Institutes of Health Stroke Scale score (NIHSS) of ≥4 points from baseline within 24 hours of endovascular treatment.

Comparison of Elderly Patients With Younger Patients

The patients were categorized into 2 age groups: ≥ 80 years old and <80 years old. This cutoff for age in the older group was determined according to the categorization for the most elderly group described in the HERMES study.[6] Outcomes for each of these groups were then compared.

Assessment of Prognostic Predictors for Good Outcome

In all patients, we performed univariate and multivariate analyses to assess which prognostic factors (e.g., age, gender, clinical, and treatment measures) predicted a favorable outcome at 90 days.