Regionwide Retrospective Survey of Acute Mechanical Thrombectomy in Tama, Suburban Tokyo: A Preliminary Report

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Background and Purpose: To improve results of acute thrombectomy, the time from stroke onset to efficient recanalization must be minimized. Studies have confirmed the importance of rapid treatment, workflow, and efficient team-based care for acute thrombectomy in large vessel occlusion. This study examined the challenges facing mechanical thrombectomy in the Tama area (population, 4.3 million), a densely populated urban area of Tokyo, Japan, and analyzed retrospective data from the Tama-REgistry of Acute endovascular Thrombectomy. *Methods:* This study was a retrospective observational study using data from Tama-REgistry of Acute endovascular Thrombectomy, a multicenter registry of mechanical thrombectomy for acute ischemic stroke in the Tama area of Tokyo. The survey covered 396 patients with large vessel occlusion who underwent acute thrombectomy between January 2015 and March 2017. Participating facilities are 12 of the 13 recanalization therapy-capable stroke centers. *Results:* We analyzed 326 cases for which modified Rankin Scale score at 90 days was available, of which 264 cases were directly admitted, and 62 cases were transferred from other stroke centers. Median time from stroke onset to hospital arrival was 111 minutes, and from arrival to efficient recanalization was 135 minutes. Efficient recanalization was achieved in 257 cases (78.8%), symptomatic hemorrhage developed in 19 cases (5.8%), and modified Rankin Scale 0-2 at 90 days was seen in 129 cases (39.6%). The vast majority of patients (n = 299, 94.3%) were transferred within 10 km to the enrolling hospital. *Conclusions:* These results provide useful information about the emergent transfer system for patients with large vessel occlusion in a densely populated urban area.

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Background

The HERMES study, a meta-analysis of 5 studies, showed that patients with a favorable outcome (modified Rankin scale score [mRS] 0-2 after 90 days) increased by about 20% with the addition of endovascular treatment (EVT) to medical therapy including intravenous thrombolysis using recombinant tissue-type plasminogen activator.[1] Improving the results of acute thrombectomy requires shortening of the time from stroke onset to efficient recanalization. Various studies have confirmed the importance of rapid treatment, workflow, and efficient team-based care for acute thrombectomy for large vessel occlusion (LVO). In addition, a prehospital and in-hospital approach is required to achieve these shorter times.

As the average annual number of patients treated per facility is relatively small according to a 2016 questionnaire in Japan, development of the diagnosis and treatment system for endovascular therapy is necessary for the future.[2] The Tama area of suburban Tokyo includes 30 municipalities (excluding 23 ward and island departments) in the western half (about 1160 km^2) of metropolitan Tokyo, with a resident population of 4.3 million (about one third of Tokyo citizens). We examined the implementation status of endovascular therapy for acute major arterial occlusive disease in the Tama area, Tokyo. The aim of this investigation was to discover factors influencing the therapeutic outcome and its assessment, as well as to identify challenges. This study shed light on the challenges facing mechanical thrombectomy in the Tama area as a densely populated urban area, and analyzed retrospective data from the Tama-Registry of Acute endovascular Thrombectomy (TREAT).

Clinical Materials and Methods

This study was a retrospective observational study using data from TREAT (UMIN-CTR: UMIN000026888), a multicenter registry of mechanical thrombectomy for acute LVO in the Tama area. The survey covered 396 patients with LVO who underwent acute thrombectomy between January 2015 and March 2017. Occlusion sites of the internal carotid artery, middle cerebral artery, anterior cerebral artery, vertebral artery, and basilar artery were included. All patients were registered retrospectively. Participating facilities were 12 of the 13 recanalization therapy-capable stroke centers in the Tama area of Tokyo, Japan. Inclusion criteria were: acute LVO treated by endovascular recanalization therapy, recanalization therapy performed in stroke centers in the Tama area. Exclusion criteria were categorization as unfit for participation in this study by the patient's doctor.

Therapeutic approach: The doctor in charge of therapy in the facility determines the therapeutic approach deemed most appropriate. No restrictions are placed on thrombus retrieval with stent-based retrievers or suction devices, or on recanalization therapy such as percutaneous transluminal cerebral angioplasty, local fibrinolytic therapy, and stenting. Similarly, no restrictions are placed on anesthesia method, antithrombotic therapy, equipment used, or postoperative care.

Basic survey items: Age, sex, location of onset or patient accommodation, patient transportation method (direct transportation, transfer from other hospital, onset while in hospital), onset date and time, mRS prior to onset, National Institutes of Health Stroke Scale during hospitalization, major arterial occlusion site, Alberta Stroke Program Early CT Score-diffusion-weighted imaging,[3] cerebral infarction etiology, and types of internal medication.

Therapy content survey items: Time related to therapy, devices used, recanalization of occluded vessels (Thrombolysis in Cerebral Infarction grade), presence/absence and content of therapy complications, presence/absence of intracranial cranial hemorrhage after therapy.

Tracking items: mRS at discharge and after 3 months.

Primary outcome: Good clinical outcome was defined as mRS 0-2 at 90 days.

Secondary outcomes: Relevance between emergency transport system and therapy duration, location of patient's accommodation and time at which therapy ensued, and comparisons between direct transport and transfer cases in terms of times related to therapy, therapeutic complications, and outcome.

All study protocols were approved by the ethical committee of each participating institute. Each participant provided informed consent and the consent was written.

Statistical Analysis

All statistical analyses were performed using EZR (Saitama Medical Center, Jichi Medical University, Saitama, Japan), which is a graphical user interface for R (The R Foundation for Statistical Computing, Vienna, Austria).[4] More precisely, EZR is a modified version of R Commander designed to add statistical functions frequently used in biostatistics. Analysis was performed comparing proportion of patients from another hospital, time metrics from stroke onset to efficient recanalization, the proportion of patients with mRS 0-2 between patients divided into 3 to 4. groups based on the distance from stroke onset

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