Cerebrovasc Dis 2012;33:92–93
DOI: 10.1159/000331930

Successful Intravenous rt-PA Thrombolysis for a Childhood Cardioembolic Stroke with Emery-Dreifuss Muscular Dystrophy

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Introduction

Patients and carriers of Emery-Dreifuss muscular dystrophy (EDMD), a known inherited muscular disorder [1], are at high risk of sudden death due to arrhythmias, heart failure, and embolism

[2]. During a 1- to 30-year follow-up of 18 EDMD patients, 61% of patients developed atrial fibrillation or flutter and 36% suffered embolic stroke [3]. We report a child with EDMD who successfully underwent intravenous recombinant tissue plasminogen activator (rt-PA) treatment for cardioembolic stroke.

Case Report

A right-handed 12-year-old boy had suffered from pathologically proven EDMD for 7 years and required a wheelchair in daily life due to limb weakness. He had been given warfarin for one year because of chronic atrial fibrillation and suddenly developed left-sided motor weakness and was admitted to our hospital. On admission, he was alert and had a conjugate gaze deviation to the right, dysarthria, and complete left hemiparesis including the face. His National Institute of Health Stroke Scale (NIHSS) score was 15. International Normalized Ratio (INR) was 1.49. Head CT showed indistinctness of the right lenticular nuclei and a right hy-

Fig. 1. **A, B** Head CT on admission showing the hyperdense MCA sign (**A**) and obscuration of the lenticular nuclei in the right hemisphere (**B**). **C** Diffusion-weighted image 7 days after admission showing an infarct in the right MCA territory. **D** TCCS on admission. The right MCA trunk cannot be identified and its blood flow is markedly diminished, indicating an occlusion of the right MCA trunk. **E** One day after admission, the right MCA trunk is intact on both the B-mode and flow image of TCCS. **F** Transesophageal echocardiography showing smoke-like echo in the left atrial appendage.

perdense middle cerebral artery (MCA) sign (fig. 1A, B). Transcranial color-coded sonography (TCCS) did not identify the right MCA (fig. 1D). At 179 min after onset, he was treated with 0.6 mg/kg of intravenous alteplase, the dose recommended for adults in the Japanese labeling and Japan Stroke Society guidelines. One hour later, the conjugate deviation disappeared, and motor weakness improved. The next day, TCCS and MR angiography showed complete recanalization of the right MCA (fig. 1E). Anticoagulation therapy was resumed at 24 h after the treatment at the therapeutic dose. On transesophageal echocardiography, strong smoke-like echo with slow peak outflow (17.3 cm/s) was identified in the left atrial appendage (fig. 1F). Intracranial hemorrhage was not identified on follow-up CT or MRI. He recovered to the premorbid level after 3 month rehabilitation (NIHSS score was 7).

Discussion

Although intravenous thrombolytic therapy is effective for stroke in adults, the data on dosing, safety and efficacy for childhood stroke are lacking. A 15-year-old girl was reported to have a drastic recovery from dense right hemiplegia and global aphasia after intravenous rt-PA [4]. In addition, ten cases of children treated with IV rt-PA were reported and summarized in a study from the International Pediatric Stroke Study (IPSS) [5]; three of these recovered completely from the initial neurological deficits and the other seven did to some extent. In contrast, none of the nine children treated with IV rt-PA in the IPSS were neurologically normal at hospital discharge [5]. Of all the above 20 cases, none were reported to develop symptomatic intracranial hemorrhage [4, 5]. Of 46 children receiving thrombolysis for stroke from the United States Nationwide Inpatient Sample, 26 were dead or dependent at discharge but none developed intracranial hemorrhage after rt-PA treatment [6]. Although a statement from the American Heart Association does not recommend thrombolytic therapy for childhood stroke at present, except for venous thrombosis [7], thrombolysis may be a suitable acute treatment for avoiding death and severe disability in children with myopathies with cardiac involvement who are at a high risk of cardioembolic stroke. Since it generally takes a long time to differentiate childhood stroke from stroke mimics such as seizure, migraine, or psychosis [8], quick and accurate diagnosis is essential. Lower doses of alteplase than the Western standard dose (0.9 mg/kg) may be safe and effective for children [9]. To assess the safety and feasibility

of thrombolytic therapy with rt-PA in acute childhood stroke, an international multicenter clinical trial, the Thrombolysis in Pediatric Stroke (TIPS) study, will start in 2011 [10].

Acknowledgement

This report was supported in part by grants-in-aid from the Ministry of Health, Labor, and Welfare of Japan (H21-Junkanki-Ippan-017).

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