

Motor function in patients with appearance of transpontine fibers from affected CST during recovery

Sung Ho Jang^{1†}, You Sung Seo^{1†}, Jong Bum Kim^{1*†}

Yeungnam University Medical Center, Department of Rehabilitation Medicine¹

Objectives

We investigated motor function in patients with the appearance of transpontine fibers from the affected corticospinal tract (CST) during motor recovery following putaminal hemorrhage by using diffusion tensor tractography (DTT).

Methods

Among 41 consecutive patients with putaminal hemorrhage, we examined 12 patients with the appearance of transpontine fibers from the affected CST at the chronic stage that were not observed at the early stage. Motor function was evaluated three times after putaminal hemorrhage onset (early stage [first DTT, 12.7 ± 2.2 days], chronic stage [second DTT, 143.9 ± 141.7 days], and final outcome [297 ± 288 days]) by assessing patients' Motricity Index (MI), Modified Brunnstrom Classification (MBC), and Functional Ambulation Category (FAC).

Results

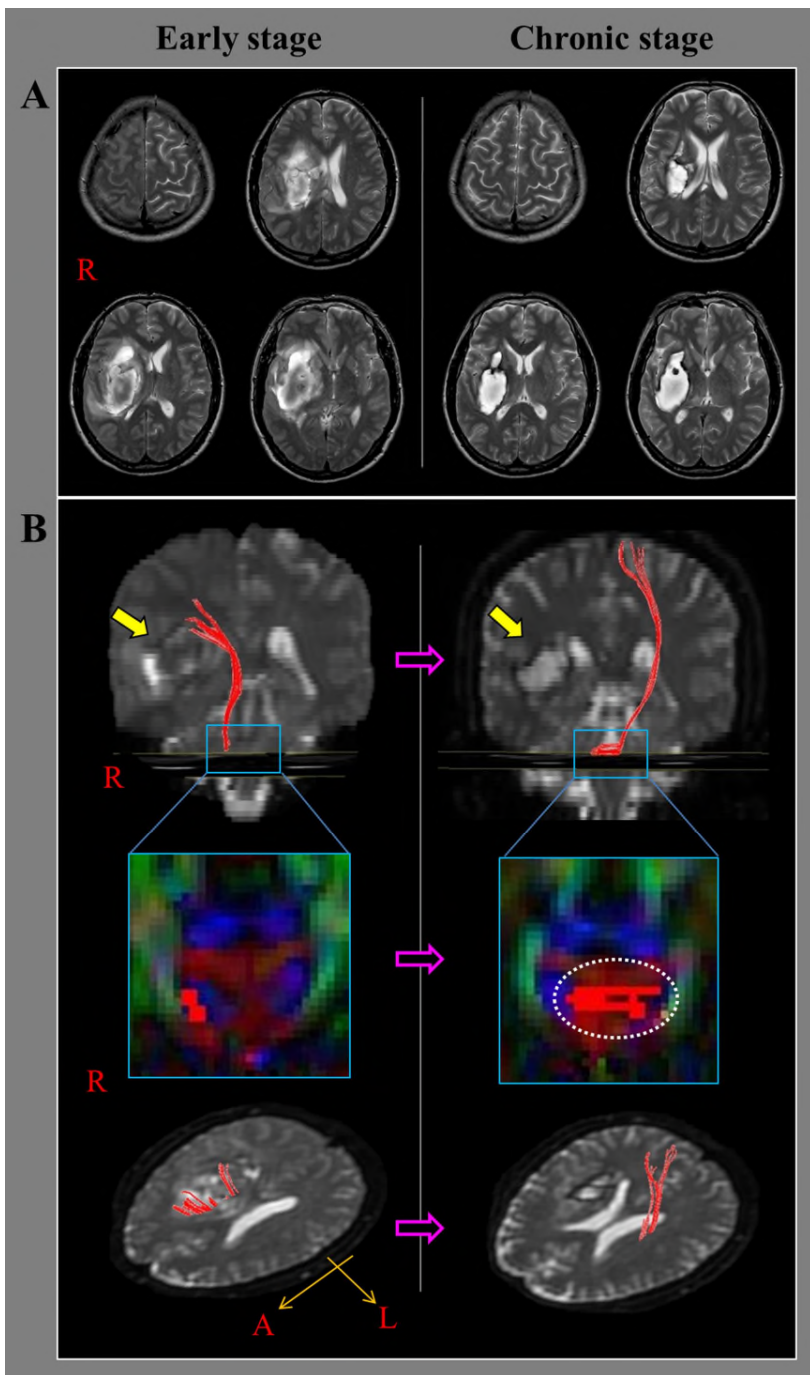
Motor function at the early stage showed severe impairment with average MI = 5.3, MBC = 0.6, and FAC = 0.0. However, these recovered to average MI = 45.8, MBC = 2.0, and FAC = 2.0 at the chronic stage and MI = 46.1, MBC = 2.2, and FAC = 2.3 at final outcome. Among the 12 patients, only one patient (8.3%) and six patients (50.0%) recovered to a functional state in hand (MBC 5~6) and gait (FAC 3~5) functions, respectively.

Conclusions

We examined the motor function of patients who showed the appearance of transpontine fibers from the affected CST during motor recovery following putaminal hemorrhage. Appearance of transpontine fibers from the affected CST during recovery appeared to be a motor recovery mechanism, although it is related to poor motor function outcome.

Acknowledgment

This work was supported by the National Research Foundation of Korea (NRF) grant funded by the Korean Government(MSIP) (No. 2018R1A2B6000996).



(A) T2-weighted brain magnetic resonance images of one representative patient (47-year-old male) in the right hemisphere at the early (13 days after onset) and chronic (50 days after onset) stages after putaminal hemorrhage. **(B)** Results of diffusion tensor tractography for the corticospinal tract (CST). In the early stage, the affected (right) CST is discontinued around the hematoma (yellow arrow). However, at the chronic stage, the affected CST is crossed to the unaffected hemisphere via transpontine fibers (white circle) at the pontine level

Table 1. Demographic characteristics of study patients.

	Patients
Age (years)	53.2 ± 10.2
Sex (male:female)	8:4
Lesion side (right:left)	5:7
Mean duration to 1st DTT from putaminal hemorrhage onset (days)	12.7 ± 2.2
Mean duration to 2nd DTT from putaminal hemorrhage onset (days)	143.9 ± 141.7

Values are presented as means ± standard deviation; DTT: diffusion tensor tractography.

Demographic characteristics of study patients.

Table 2. Change in motor function according to time from putaminal hemorrhage onset.

	MI score			MBC	FAC
	Upper	Lower	Total		
Early stage	4.7 ± 10.9	5.8 ± 13.9	5.3 ± 12.4	0.6 ± 0.5	0.0 ± 0.0
Chronic stage	43.9 ± 21.2	48.6 ± 17.6	45.8 ± 18.3	2.0 ± 1.2	2.0 ± 0.8
Final outcome	45.1 ± 19.1	47.2 ± 18.9	46.1 ± 17.2	2.2 ± 1.0	2.3 ± 1.0

Values are presented as means ± standard deviation; MI: Motricity Index; MBC: Modified Brunnstrom Classification; FAC: Functional Ambulation Category; DTT: diffusion tensor tractography.

Change in motor function according to time from putaminal hemorrhage onset.