

Injury of corticofugal tracts from the secondary motor area in patients with putaminal hemorrhage

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Objectives

We investigated injury of the corticofugal tracts (CFTs) from the secondary motor area in patients with putaminal hemorrhage by performing diffusion tensor tractography (DTT).

Methods

Forty-four patients with putaminal hemorrhage and 41 age- and sex-matched control subjects were recruited. A probabilistic tractography method was used in fiber tracking for reconstruction of the corticospinal tract (CST) and the CFT. Fractional anisotropy (FA), mean diffusivity (MD), and tract volume of the CSTs and CFTs from the dorsal premotor cortex (dPMC) and supplementary motor area (SMA) were measured.

Results

Patients showed severe motor weakness (motricity index [MI] = 57.6/100). In the affected hemisphere of the patient group, the FA and tract volume of the CST and CFTs were significantly lower than those of the unaffected hemisphere and the control group ($p < 0.05$). MI was strongly positively correlated with the FA of the affected CST in the patient group ($p < 0.05$, $r = 0.783$). However, we did not detect any correlations between MI and DTT parameters (FA, MD, or tract volume) of the CFTs ($p > 0.05$).

Conclusions

The DTT results demonstrated concurrent injuries of the CFTs from the dPMC and SMA with injury of the CST in patients with putaminal hemorrhage. Our results suggest that limb-kinetic apraxia ascribed to injury of the CFTs from the secondary motor area could be accompanied by injury of the CST following putaminal hemorrhage.

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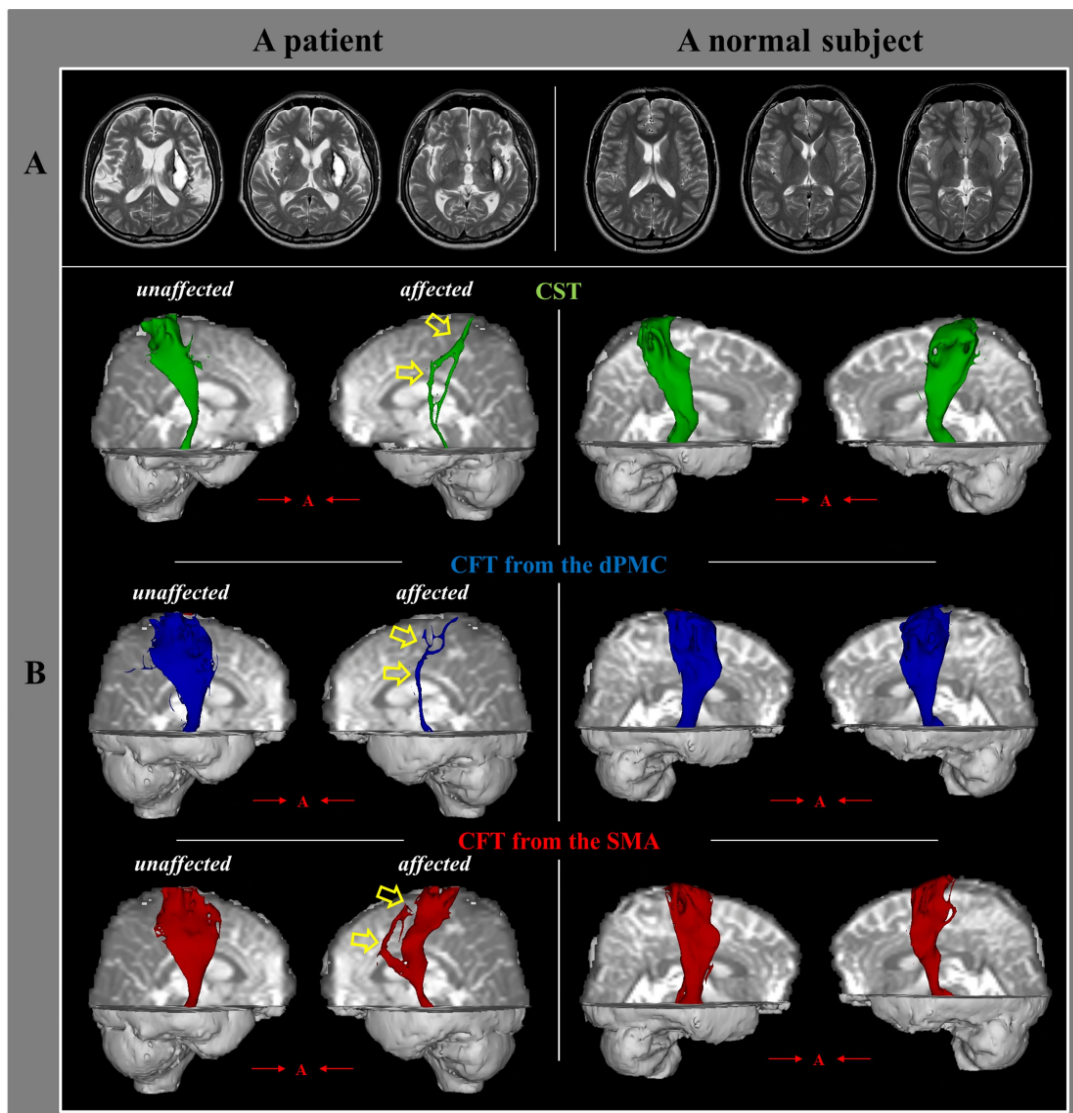


Fig. 1. (A) T2-weighted brain magnetic resonance images of a patient (55-year-old male) and a normal subject (56-year-old male). (B) Results of diffusion tensor tractography. The corticospinal tract (CST, green color) and the corticofugal tracts (CFTs) from the dorsal premotor cortex (dPMC, blue color) and supplementary motor area (SMA, red color) are reconstructed in both hemispheres. Injured neural tracts are indicated with yellow arrows.