

뇌신경재활

게시일시 및 장소 : 10 월 18 일(금) 13:15-18:00 Room G(3F)

질의응답 일시 및 장소 : 10 월 18 일(금) 16:13-16:17 Room G(3F)

P 2-32

Changes of arcuate fasciculus and recovery of post-stroke aphasia: a 6-month follow-up DTI study

Cho Rong Bae^{1*}, Yoonhye Na³, Minjae Cho³, Woo-Suk Tae², Yu Mi Hwang², Hee-Kyu Kwon¹, Sung-Bom Pyun^{1,2†}

Korea University College of Medicine, Department of Physical Medicine and Rehabilitation¹, Korea University, Brain Convergence Research Center², Korea University, Department of Biomedical Sciences³

OBJECTIVES

Recently, there is growing interest in using diffusion tensor imaging(DTI) to better understand neuroanatomical factors associated with aphasia recovery. Few studies, however, examined the structural change of language networks over time, and its relation with aphasia recovery. We evaluated the changes of arcuate fasciculus (AF), an important connecting pathway for language function, using DTI at 1-month and 6-month after stroke and investigated the relationship between structural changes of AF and improvement of post-stroke aphasia.

METHODS

We collected data from the STroke Outcome Prediction (STOP) database that is prospective data collecting system for functional recovery prediction after stroke based on neuroimaging study. Inclusion criteria were (1) first-ever left supratentorial stroke; (2) presence of aphasia evaluated by Korean version of Western Aphasia Battery (K-WAB) (Aphasia Quotient (AQ) < 92.8 points); and (3) no previous neurological or psychiatric diagnosis. The K-WAB and DTI data within 30 days (initial) and six months after (follow-up) stroke onset were used for analysis. And fractional anisotropy (FA), mean diffusivity (MD), fiber number (FN) and differences (Δ) at two time points of these parameters were obtained in bilateral AF tracts in diffusion tensor tractography (DTT). Three types (I: not reconstructed, II: disrupted, discontinued or shallow, III: preserved) of classification according to integrity of AF was also included. A Classification and Regression Tree (CART) analysis was carried out to determine which factors best predict outcome category.

RESULTS

Twenty-six patients with aphasia were included. AQ significantly improved at 6 months after onset as compared to initial evaluation. DTT parameters of bilateral AF showed statistically significant decrease in FA and increase in MD(Table 1). Types of AF were changed in 6 patients(23%): 3 patients from type III to type II, 2 patients from type II to

type I, and 1 patient from type II to type III. In Pearson's correlation analysis, significant correlation was observed between 6-mon AQ score and parameters of left AF; positive correlation with FA ($r=0.707$, $p<0.001$), and negative correlation with MD ($r=-.540$, $p<0.001$). However, there was no correlation between 6-mon AQ score and FN of left AF, and all parameters of right AF. In addition, Δ DTT parameters were not correlated with either 6-mon AQ or Δ AQ. CART analysis produced a decision tree with initial FA value as the first decision point, with an overall prediction accuracy of 68%; patients with initial FA lower than 0.44100 were more likely to have poor outcome(Fig. 1).

CONCLUSIONS

The AF changes over time not only in dominant but also in nondominant hemispheres in patients with aphasia after stroke. But amount of changes (Δ) in AF parameters were not associated with language recovery. Initial FA value can be used as a predictive neuroimaging biomarker for 6-month language outcome in poststroke aphasia.

Acknowledgment :No potential conflict of interests relevant to this article were reported. This work was supported by the National Research Foundation of Korea (NRF) grant funded by the Korea government (MSIT) (No. 2019R1A2C2003020).

Table 1. Parameters of diffusion tensor tractography in bilateral arcuate fasciculus

	Mean (SD)			p-value
	Initial	Follow-up	Changes (Δ)	
Left				
FN	964 (850)	866 (784)	-97 (606)	0.449
FA	.409435 (.053538)	.393439 (.039887)	-.015996 (.036341)	0.046*
MD	.000781 (.000063)	.000836 (.000094)	.000055(.000091)	0.008*
Right				
FN	1011 (862)	1217 (912)	207 (609)	0.096
FA	.455465 (.032664)	.448838 (.028853)	-.006627 (.016346)	0.049*
MD	.000759 (.000045)	.000767 (.000046)	.000008 (.000015)	0.016*

*: statistically significant difference ($p<0.05$)

Table 2. Types of left arcuate fasciculus at 1-and 6-month after stroke

Types	1-mon (%)	6-mon (%)
Type I	1 (4.0)	3 (11.5)
Type II	7 (27.0)	7 (27.0)
Type III	18 (69)	16 (61.5)
Total	26 (100.0)	26 (100.0)

Type I: not reconstructed; Type II: disrupted, discontinued or shallow; Type III: preserved

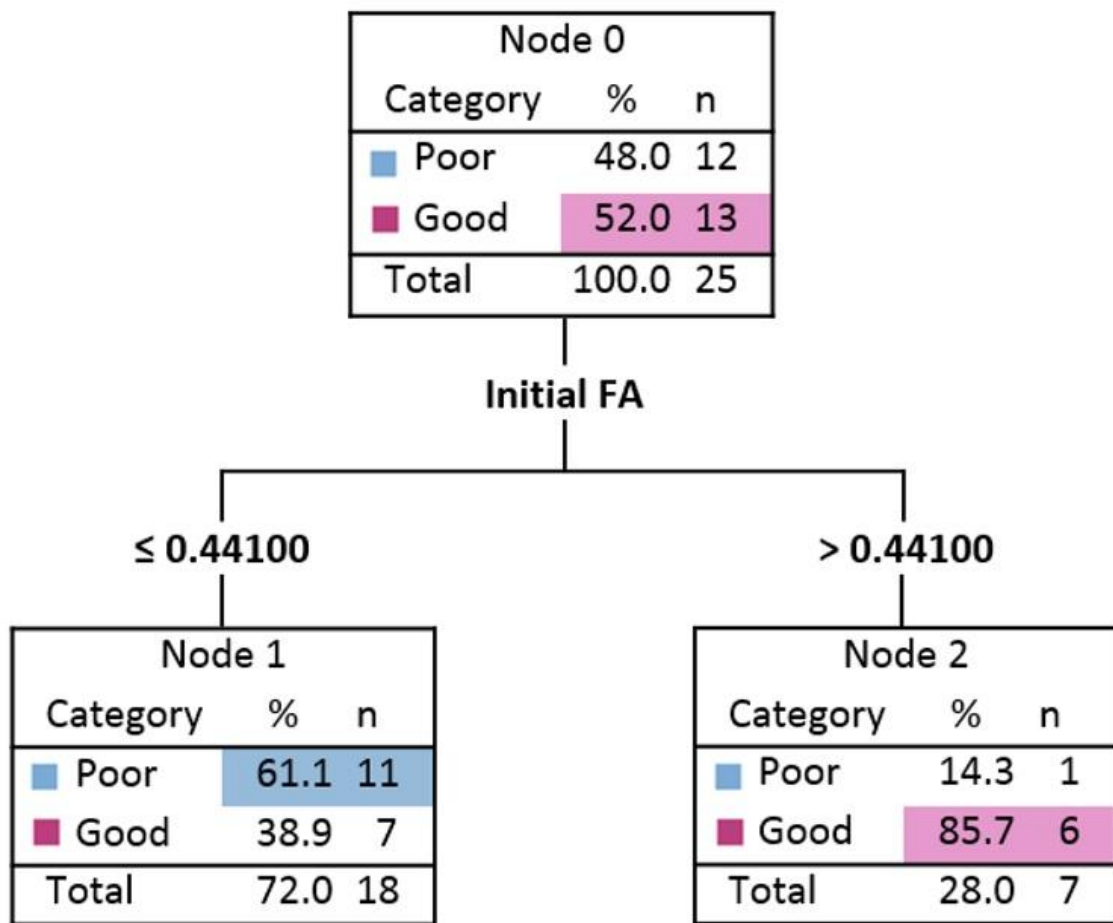


Figure 1. CART analysis to identify parameters of diffusion tensor tractography that predict aphasia outcome at 6-month after stroke onset. Patients were classified into two groups, good and poor outcome group, based on the median value of follow up-AQ score.