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Prognostic factors of swallowing recovery in patients with dysphagia after ischemic stroke

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Introduction

Dysphagia is a common complication of stroke patients. In stroke patients, dysphagia is associated with poor long term outcome and high mortality. However, it is still difficult to evaluate the prognosis for dysphagia after stroke. Prediction of swallowing recovery can help determine alternative feeding methods and set the goal of feeding. The object of this study was to investigate the prognostic factors of swallowing recovery in patients with ischemic stroke.

Material and method

This is a cohort analysis of all acute ischemic stroke patients admitted from 2011 to 2017. This experiment included the patients (1) who had first acute ischemic stroke, confirmed by MRI and (2) who were observed Dysphagia Outcome and Severity Scale (DOSS) level below 5 by a video fluoroscopic swallowing study (VFSS). The DOSS is previously developed dysphagia scale based on measures obtained from VFSS. The DOSS level 7 means normal swallowing function and level 6 means swallowing function within functional limits. The DOSS levels less than 5 indicate dysphagia, and lower levels mean severe dysphagia. Follow-up VFSS was done until 1 year after stroke and discontinued if VFSS results in DOSS level 6 or 7. The covariates assessed by multivariate Cox's proportional hazards model, which event is set by recovery of swallowing function to the DOSS level 6 or 7. For further study, age was divided into more and less than 75, 80, and 85, respectively. The DOSS level was dichotomized into more and less than 4, which may exhibit aspiration with weak or no reflexive cough. We used the Kaplan-Meier method to identify log-rank test and generate a curves for the proportion of people with recovery. Hazards ratio (HRs) for effects of aging and severity of dysphagia were calculated by Cox's proportional hazards model.

Results

A total of 183 patients were included for the study and Table 1 shows the characteristics of them. Using a multivariate Cox's proportional hazards model, it was determined that the age of onset and the initial DOSS level were significantly related to dysphagia recovery (table 2). In addition, the patients with bilateral lesions were not normalized in swallowing function. Total 41 patients (22%) recovered to normal swallowing, however patients older than 85 years did not recover to normal swallowing. The patients older than 80 years and under the initial DOSS level 4 have a significantly reduced rate of recovery (HRs 0.317, 95% CI 0.097-1.032; Log-rank p=0.044; Figure 1(A) and HRs 0.233, 95% CI 0.121-0.451; Log-rank p=<0.001; Figure 1(B)).

Conclusion

The aging, severity of initial dysphagia, and bihemispheric lesion are negatively associated with recovery to normal swallowing in first ischemic stroke patients. Especially the age over 80 years and initial DOSS level under 4 are poor prognostic factors affecting swallowing recovery during 1 year after stroke. This study was supported by the fund of Minister of Education, NRF-2017R1D1A1B03032899.

Table 1. Characteristics of patients

Characteristics	Value
Age (years)	69.5±12.4
Gender	
Male	111 (60.7%)
Female	72 (39.3%)
Location	
Supratentorial	135 (73.8%)
Infratentorial	38 (20.8%)
Multiple lesion	10 (5.5%)
Lateralization	
Right hemispheric lesion	98 (33.7%)
Left hemispheric lesion	74 (25.4%)
Bispheric lesion	11 (6.0%)
NIHSS	9.2±6.2
Initial DOSS (level)	3.5±1.3
Level 1	17 (9.3%)
Level 2	34 (18.6%)
Level 3	28 (15.3%)
Level 4	57 (31.1%)
Level 5	47 (25.7%)
Comorbidities	
Hypertension	102 (55.7%)
Diabetes	50 (27.3%)
Dyslipidemia	13 (7.1%)
Coronary artery disease	11 (6.0%)
Atrial fibrillation	48 (26.2%)
Chronic obstructive pulmonary disease	2 (1.1%)

Table 2. Multivariate Cox's proportional hazards model for the covariates

Covariates	Hazard ratio	95% CI	P value
Age of onset (year)	0.975	0.951, 1.000	0.046*
Initial DOSS (level)	1.768	1.279, 2.444	0.001*
Baseline NIHSS	0.971	0.874, 1.078	0.581
Loss of consciousness	1.149	0.871, 1.516	0.324
Facial palsy	1.067	0.612, 1.861	0.612
Dysarthria	1.194	0.655, 2.176	0.563
Bihemisphere	UA	UA	UA
Infratentorial lesion	0.918	0.333, 2.529	0.869

* p < 0.05

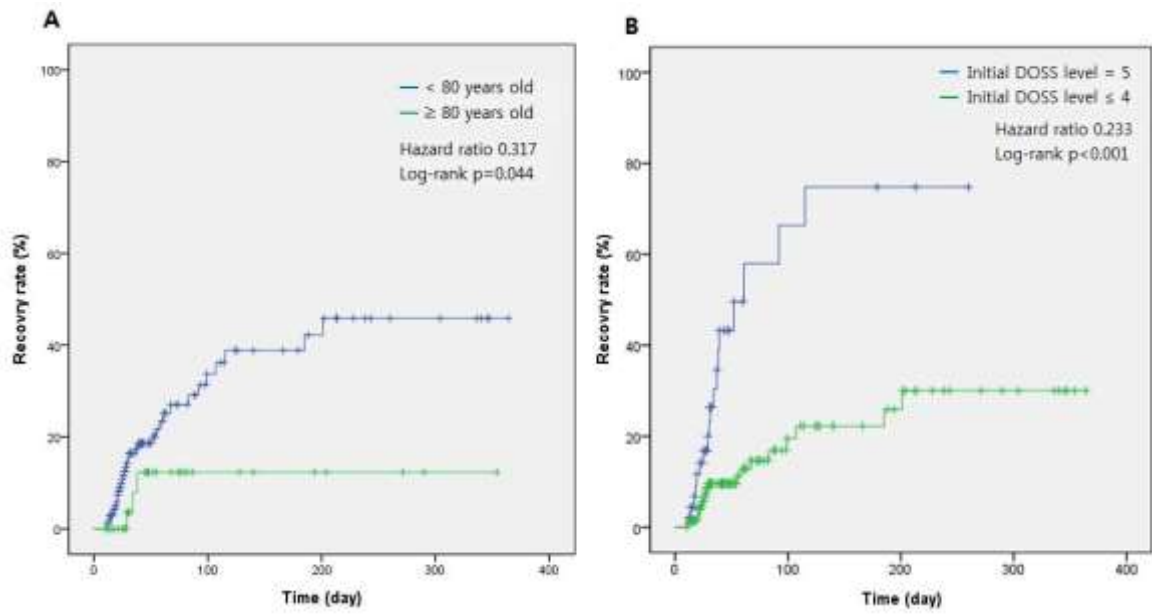


Fig 1. Kaplan-Meier method to curves for the proportion of people with recovery;
 (A) Recovery rate in people with older than 80 years compared to under 80 years and
 (B) Recovery rate in people with the initial DOSS level under 4 compared to level 5