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Characteristics and Risk Factors for Dysphagia following Lesions of Cerebellum

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Objective

The cerebellum works in motor coordination, timing, sequencing, and proprioceptive feedback. Given an understanding of the established role of the cerebellum, it might have a supportive role in swallowing-related functions. However, the understanding of patterns of dysphagia in cerebellar lesions remains ambiguous with equivocal results in a few previous studies. Therefore, we investigated the characteristics and risk factors of dysphagia with the Videofluoroscopic Dysphagia Scale (VDS) using a videofluoroscopic swallowing study (VFSS) in patients with stroke of cerebellum.

Methods

Subjects of this study were the cerebellar stroke patients who had undergone a VFSS in the our rehabilitation Department from February 2003 to December 2018. VFSS was done to screen for dysphagia or when a patient was referred for evaluation of swallowing difficulty. Patients with cerebellar lesions were included in this study, who have been verified by computed tomography (CT) or magnetic resonance imaging (MRI). Among them, patients with other disease which could cause dysphagia and missing medical records or incomplete admission notes were excluded from the study. A total of 40 subject's medical records were chosen for study, and the data about these patients were collected retrospectively. Characteristics of dysphagia were evaluated using VFSS and all subjects were divided into a high (>47) and low risk group (<47) by the VDS score. Clinical and functional parameters were recorded by medical records including demographics, hypertension, diabetes mellitus (DM), and tracheal tube insertion status, as well as Korean version of the Mini-Mental Status Examination (K-MMSE) and initial functional independence measure (FIM) score. Radiologic factors identified the location of the right, left , and both lesions, and other lesions were also confirmed.

Results

Table 1 showed that abnormalities in the oral phase were more prominent than pharyngeal phase in patients with cerebellar lesions. Table 2 displays univariate analysis results. The number of patients assigned to the high-risk group (VDS>47) was 21(52.5%) , and the low-risk group 19(47.5%). The insertion of tracheal tube, the presence of IVH, K-MMSE, and

initial FIM score differed significantly between the two subgroups. All significant parameters were adjusted in the multivariate analysis as shown in Table 3. The parameter-K-MMSE was independently predisposing for dysphagia after stroke in patients with cerebellar lesions.

Conclusion

This study demonstrated that abnormalities in the oral and pharyngeal phase were present in patients with cerebellar lesions. The risk factors associated with dysphagia after cerebellar stroke was cognitive status as measured by the K-MMSE.

Table 1. Characteristics of dysphagia using VFSS in cerebellar stroke

Characteristics	Abnormality	
	Yes(%)	No(%)
Oral phase		
Bolus formation	27(68%)	13(32%)
Mastication	25(63%)	15(37%)
Tongue movement	31(78%)	9(22%)
Pharyngeal phase		
Swallowing delay	28(65%)	14(35%)
Vallecular residue	29(62%)	15(38%)
Pyriform sinus residue	30(67%)	13(33%)
Aspiration	24(72%)	11(28%)

Table 2. Univariate analysis for identification of parameters which were associated with dysphagia after stroke in patients with cerebellar lesions

Parameter	Low risk (n=19)	High risk (n=21)	p-value
Age(yr)	61.21±14.8	68.24±13.1	0.119
Sex			0.796
Male	11(57.9)	13(61.9)	
Female	8(42.1)	8(38.1)	
Hypertension	11(57.9)	9(42.9)	0.342
DM	3(15.8)	4(19.0)	0.787
Tracheal tube	2(10.5)	10(47.6)	0.011*
Cerebellar lesion side			0.338
Right	9(47.4)	6(28.6)	
Left	3(15.8)	7(33.3)	
Both	7(36.8)	8(38.1)	
With IVH	3(15.8)	10(47.6)	0.032*
K-MMSE	23.11±5.7	11.33±7.2	0.0001**
Initial FIM score	59.79±22.5	34.38±14.6	0.0001**
VFSS time from the onset	56.68±75.8	64.71±66.2	0.752

*P<0.05, ** P<0.01
Values are mean ± standard deviation
DM, Diabetes mellitus; IVH, Intraventricular hemorrhage; K-MMSE, Korean version of the mini-mental estimtate examination; FIM, Functional independence measure; VFSS, Videofluoroscopic swallowing study

Table 3. Multivariate logistic regression model for prediction of high risk for dysphagia after cerebellar stroke

	OR	95% CI	p-value
Tracheal tube	1.040	0.121-8.935	0.972
With IVH	0.519	0.068-3.979	0.528
K-MMSE	1.329	1.115-1.584	0.002*
Initial FIM score	0.970	0.892-1.054	0.467

*$P<0.05$, ** $P<0.01$
IVH, Intraventricular hemorrhage; K-MMSE, Korean version of the mini-mental estimtate examination; FIM, Functional independence measure