

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) 15:45-16:30 Room G(3F)

## **P 2-89**

### **Relationship between Head Lifting Strength and Submental Ultrasonography In Post-Stroke Dysphagia**

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#### **Objective**

Head lifting strength is known to be associated with dysphagia with aspiration and in older adults. Shaker et al. reported that head lifting strength in stroke patients resulted in significant improvements in dysphagia. It has been reported that atrophy of the geniohyoid muscle(GM) or tongue muscle(TM) increases the risk of aspiration. In this study we aim to clarify the relationship between head lifting strength and submental ultrasonographic findings in stroke patients. Furthermore, we will identify the relationship between the findings and values of videofluoroscopic swallowing study(VFSS) in post-stroke dysphagia.

#### **Methods**

A cross-sectional study was performed in 15 patients, who had been recommended to undergo VFSS in our institution between August 2018 and June 2019. Head lifting strength was assessed by 4 indices: angle between the transverse line and the line from the mid-tragus to the C7 spinous process(MNFA, Maximal Neck Flexion Angle), distance between the Inion and the floor of the bed(MHFL, Maximal Head-Floor Length), distance between the Gnathion and jugular notch(mCNL, Minimal Chin-Notch Length), distance between the tip of the tongue and the upper incisors during maximum protrusion(MTPL, Maximal Tongue Protrusion Length). MNFA, MHFL and mCNL were measured during maximum flexion of the neck in supine position. Two-dimensional views in the coronal or sagittal planes were used to measure the thickness and cross-sectional area of GM and TM. Anthropometric markers were measured, including body mass index(BMI), body surface area(BSA), circumference of calf(CC), upper arm(UAC)and neck(NC). A digital hand grip gauge (Takei 5401, Takei Scientific Instruments, Tokyo, Japan) was used to measure hand grip strength(HGS). The severity of dysphagia was evaluated using the videofluoroscopic dysphagia scale(VDS) and it represent oral and pharyngeal functions. Statistical analysis were done using correlation analysis prepared by PASW 18.0 for Windows, and the chosen level of statistical significance was <0.05.

#### **Results**

Demographic data and clinical characteristics of the enrolled patients are displayed in Table1. Correlation analysis showed that MNFA, MHFL, MTPL, CC, UAC, NC, HGS and BSA

were correlated with sonographic findings (Table 2). Correlation analysis showed that sonographic findings, especially TM area were correlated with VDS, especially oromotor subscale (VDS-O) (Table 3).

### Conclusion

This study demonstrated that submental sonography has a significant correlation with head lifting strength and preexisting sarcopenic index. Also, TM area has a significant correlation with oral phase dysphagia. Therefore, patients with underlying sarcopenia may have an effect on head lifting strength and dysphagia, so it may be helpful to have a sarcopenia assessment in patients with dysphagic stroke. In clinical settings, evaluating related muscles with submental ultrasonography may reflect head lifting strength or dysphagia symptoms.

Table 1. Demographic and Clinical Characteristics of Subjects (n=15)

Variables	Values
<b>Indices for Head Lifting Strength</b>	
MNFA (degree)	78.27±5.90
MHFL (cm)	15.04±4.26
mCNL (cm)	4.77±1.12
MTPL (cm)	4.46±0.63
<b>Sarcopenic Indices</b>	
BMI (kg/m <sup>2</sup> )	23.54±2.40
BSA (m <sup>2</sup> )	1.72±0.16
CC (cm)	33.55±3.31
UAC (cm)	28.17±2.27
NC (cm)	39.04±3.63
HGS (kg)	25.21±8.96
<b>Dysphagia Assessment</b>	
VDS-T (score)	31.60±15.41
VDS-O (score)	6.07±6.27
VDS-P (score)	25.53±10.26

Values are mean ± standard deviation.

MMSE, Mini-Mental State Examination; FIM, Functional Independence measure; MNFA, Maximal Neck Flexion Angle; MHFL, Maximal Head-Floor Length; mCNL, Minimal Chin-Notch Length; MTPL, Maximal Tongue Protrusion Length; BMI, Body Mass Index; BSA, Body Surface Area; CC, Calf Circumference; UAC, Upper Arm Circumference; NC, Neck Circumference; HGS, Hand Grip Strength; GMT-C, Geniohyoid Muscle Thickness-Coronal plane; GMT-S, Geniohyoid Muscle Thickness-Sagittal plane; GMA-C, Geniohyoid Muscle Area-Coronal plane; GMA-S, Geniohyoid Muscle Area-Sagittal plane; TBT, Tongue Base Thickness; TMA, Tongue Muscle Area; VDS-T, Videofluoroscopic Dysphagia Scale-Total score; VDS-O, Videofluoroscopic Dysphagia Scale-Oral phase; VDS-P, Videofluoroscopic Dysphagia Scale-Pharyngeal phase

Table 2. Correlation between Clinical Characteristics and Sonographic findings (Pearson's Coefficient, r)

Variables	GMT-C	GMT-S	GMA-C	GMA-S	TBT	TMA
<b>Indices for Head Lifting Strength</b>						
MNFA (degree)	0.213	0.303	<b>0.655*</b>	0.381	0.311	0.031
MHFL (cm)	<b>0.587*</b>	<b>0.644*</b>	<b>0.877*</b>	<b>0.668*</b>	<b>0.536*</b>	0.078
mCNL (cm)	-0.187	-0.318	-0.422	-0.284	-0.143	-0.012
MTPL (cm)	<b>0.561*</b>	<b>0.554*</b>	<b>0.719*</b>	<b>0.619*</b>	0.306	0.120
<b>Sarcopenic Indices</b>						
BMI (kg/m <sup>2</sup> )	0.013	0.145	0.387*	0.223	<b>0.609*</b>	0.423
BSA (m <sup>2</sup> )	0.248	0.305	<b>0.632*</b>	<b>0.572*</b>	0.491	<b>0.546*</b>
CC (cm)	0.294	0.302	<b>0.687*</b>	<b>0.574*</b>	0.443	<b>0.548*</b>
UAC (cm)	0.431	0.484	<b>0.756*</b>	<b>0.699*</b>	0.522	0.317
NC (cm)	0.386	0.481	<b>0.691*</b>	<b>0.600*</b>	<b>0.589</b>	0.198
HGS (kg)	0.496	<b>0.535*</b>	<b>0.799*</b>	<b>0.729*</b>	0.218	0.049

\* P<0.05

MMSE, Mini-Mental State Examination; FIM, Functional Independence measure; MNFA, Maximal Neck Flexion Angle; MHFL, Maximal Head-Floor Length; mCNL, Minimal Chin-Notch Length; MTPL, Maximal Tongue Protrusion Length; BMI, Body Mass Index; BSA, Body Surface Area; CC, Calf Circumference; UAC, Upper Arm Circumference; NC, Neck Circumference; HGS, Hand Grip Strength; GMT-C, Geniohyoid Muscle Thickness-Coronal plane; GMT-S, Geniohyoid Muscle Thickness-Sagittal plane; GMA-C, Geniohyoid Muscle Area-Coronal plane; GMA-S, Geniohyoid Muscle Area-Sagittal plane; TBT, Tongue Base Thickness; TMA, Tongue Muscle Area

Table 3. Correlation between Sonographic Findings and Videofluoroscopic Dysphagia Scale (Pearson's Coefficient, r)

Variables	VDS-O	VDS-P
GMT-C (mm)	0.278	0.453
GMT-S (mm)	0.157	0.296
GMA-C (mm <sup>2</sup> )	0.118	0.181
GMA-S (mm <sup>2</sup> )	0.153	0.373
TBT (mm)	0.445	0.278
TMA (mm <sup>2</sup> )	<b>0.676*</b>	<b>0.532*</b>

\* P<0.05

GMT-C, Geniohyoid Muscle Thickness-Coronal plane; GMT-S, Geniohyoid Muscle Thickness-Sagittal plane; GMA-C, Geniohyoid Muscle Area-Coronal plane; GMA-S, Geniohyoid Muscle Area-Sagittal plane; TBT, Tongue Base Thickness; TMA, Tongue Muscle Area; VDS-T, Videofluoroscopic Dysphagia Scale-Total score; VDS-O, Videofluoroscopic Dysphagia Scale-Oral phase; VDS-P, Videofluoroscopic Dysphagia Scale-Pharyngeal phase