

The Changes of Swallowing Function before and after Expansion Sphincter Pharyngoplasty

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Objective

Some obstructive sleep apnea (OSA) patients may present swallowing dysfunction, such as premature loss of food to hypopharynx, food stasis in the hypopharynx and laryngeal penetration without subjective symptoms. Expansion sphincter pharyngoplasty (ESP) is the surgery for OSA patients to divide the muscle on the sides of the throat behind the tonsil (palatopharyngeus) and pulling it forward and laterally to sew it in place. This study was aimed to find out the changes of swallowing function using videofluoroscopic swallow study (VFSS) before and after ESP in OSA patients.

Methods

From December 2016 to March 2018, eight OSA patients (7 men and 1 woman, age: 55.37 ± 5.55 years, mean Apnea-Hypopnea Index (AHI): $33.9 \pm 21.1\%$, Body Mass Index: 26.7 ± 3.86 kg/m²), who underwent ESP were recruited. VFSS was conducted and recorded before and 1 month after ESP. We measured a few quantitative parameters of swallowing function including oral transit time (OTT), pharyngeal transit time (PTT), pharyngeal delay time (PDT) and laryngeal elevation (LE) with liquid diet (water), yogurt, soft diet (porridge) and solid diet (cooked rice). AHI is estimated from the average number of episodes of apnea (cessation of airflow with duration of at least 10 seconds) plus episodes of hypopnea (reduced airflow) per hour during sleep. Statistical analyses were performed with SPSS software program for Windows (version 23.0, Chicago, USA). Mann-Whitney U test was used to verify the differences in the quantitative parameters of swallowing function before and after ESP. Spearman's correlation analysis was done to find out the correlation between the quantitative parameters of swallowing function and AHI. A p-value < 0.05 was considered significant.

Results

1) All the parameters measured during VFSS were within normal ranges. OTT, PTT, PDT and LE in all test diets showed no differences before and after ESP, but PTT with liquid diet significantly shortened after ESP ($p = 0.050$) (Table 1). 2) There was no significant correlation between AHI and the quantitative parameters of swallowing function.

Conclusion

After ESP, pharyngeal function showed the improvement with liquid diet. ESP might help pharyngeal passage of liquid diet in OSA patients by expanding the oropharynx. However, swallowing function was not correlated with the severity of the OSA. Key words: Obstructive sleep apnea, Swallowing, Videofluoroscopic swallow study, Expansion sphincter pharyngoplasty

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	Before	After	P-value
Liquid diet			
OTT (sec)	1.05±0.70	0.58±0.38	0.105
PTT (sec)	0.46±0.18	0.31±0.13	0.050*
PDT (sec)	0.16±0.09	0.28±0.26	0.382
LE (cm)	2.40±0.45	2.45±0.38	1.000
Yogurt			
OTT (sec)	1.00±0.63	0.57±0.30	0.130
PTT (sec)	0.41±0.63	0.32±0.09	0.195
PDT (sec)	0.14±0.10	0.12±0.08	0.798
LE (cm)	2.44±0.40	2.51±0.25	0.574
Soft diet			
OTT (sec)	0.50±0.23	0.52±0.28	1.000
PTT (sec)	0.33±0.16	0.36±0.20	0.798
PDT (sec)	0.18±0.11	0.11±0.11	0.130
LE (cm)	2.52±0.35	2.55±0.40	0.798
Solid diet			
OTT (sec)	0.80±0.47	0.80±0.41	0.574
PTT (sec)	0.66±0.70	0.46±0.63	0.279
PDT (sec)	0.36±0.63	0.25±0.51	0.959
LE (cm)	2.66±0.41	2.67±0.39	0.195

Values are mean ± standard deviation; OTT, oral transit time; PTT, pharyngeal transit time; PDT, pharyngeal delay time; LE, laryngeal elevation;
 *statistically significant ($p < 0.05$) before and after ESP.

The changes of quantitative parameters of swallowing function before and after expansion sphincter pharyngoplasty