

Effect of Chin-down Maneuver in dysphagia patients by using High Resolution Manometry

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Introduction

While a number of studies have investigated the effect of swallowing compensatory maneuver on changes of pharyngeal pressure and timing among healthy subjects, only a few studies were conducted among dysphagia patients. We aimed to demonstrate the effect of the chin-down maneuver on pharyngeal pressure and timing with high resolution manometry (HRM).

Method

A total of 20 healthy subjects and 64 dysphagia patients were recruited between 2014 and 2017. Participants swallowed 5 cc of thin fluid in neutral and chin down position, respectively. Furthermore, 10 healthy subjects and 15 patients swallowed 5 cc of thick fluid (yogurt) in both positions. During swallowing, a 32 sensor HRM catheter was used to record the following parameters: maximum velopharyngeal (VP) pressure & area, maximum tongue base (TB) pressure & area, maximum low pharyngeal pressure, pre- & post-swallow UES peak pressure, minimal UES pressure, UES activity time, and nadir duration. Paired t-test and Student's t-test were used to evaluate the effect of chin down on swallowing of thin fluid, and Wilcoxon signed rank test and Mann-Whitney test on thick fluid.

Results

Compared to swallowing thin fluid in neutral position, chin-down swallowing was associated with a 7% reduction in VP pressure among dysphagia patients (p value 0.036). Chin-down swallowing was also associated with increased pressure and area of TB contraction by 14.6% (p value 0.001) and 22.9% (p value 0.009), respectively. Compared to healthy subjects, dysphagia patients had significantly lower post-swallow peak UES pressure (healthy: 32.4 mmHg, patients: 10.7 mmHg, p value 0.010) and UES activity time (healthy: 0.03 msec, patients: 0.00 msec, p value 0.032) upon swallowing thin fluid. Among dysphagia patients, chin-down swallowing of thick fluid was associated with decreased UES nadir duration (neutral: 0.30 msec, chin-down: 0.26 msec, p value 0.016) compared to neutral swallowing.

Conclusion

Our findings imply that chin-down maneuver with thin fluid may decrease VP pressure and improve tongue effort. Future studies with larger study populations are needed to further evaluate the effect of chin-down maneuver on swallowing of thick fluid.

Table 1. The changes of pharyngeal pressure parameters after the chin-down maneuver in dysphagic patients.

	Thin fluid (n=59)			Thick fluid (n=15)		
	Neutral	Chin down	p value	Neutral	Chin down	p value
Max. pressure of VP (mmHg)	166.3 (70.1)	154.0 (73.5)	0.036	150.0 (96.0)	149.5 (92.6)	0.733
Area of VP contraction.	39.7 (23.6)	38.9 (26.2)	0.708	43.6 (45.3)	47.0 (42.8)	0.363
Max. pressure of TB contraction (mmHg)	92.6 (44.0)	106.1 (49.7)	0.001	114.5 (41.9)	133.5 (62.5)	0.078
Area of TB contraction	38.0 (23.2)	46.7 (34.5)	0.009	43.9 (22.4)	51.4 (29.5)	0.088
Pre-swallow peak UES pressure (mmHg)	116.7 (68.1)	116.1 (67.2)	0.934	120.1 (55.7)	122.3 (74.0)	0.865
Max. low pharyngeal peak pressure (mmHg)	329.3 (131.6)	324.3 (141.7)	0.636	365.8 (103.7)	355.6 (109.6)	0.999
Post-swallow peak UES pressure (mmHg)	209.8 (110.6)	119.2 (105.3)	0.110	266.8 (99.6)	250.8 (90.7)	0.334
Min. UES pressure (mmHg)	-9.2 (6.7)	-8.0 (7.2)	0.117	-0.1 (20.8)	-4.6 (5.0)	0.842
UES activity time (msec)	0.72 (0.21)	0.72 (0.19)	0.915	0.82 (0.23)	0.74 (0.19)	0.070
UES nadir duration (msec)	0.26 (0.13)	0.26 (0.12)	0.669	0.30 (0.14)	0.26 (0.14)	0.016

Values are mean (SD).

p value on thin fluid was calculated by paired t-test, and p value on thick fluid was calculated by Wilcoxon signed rank test.

VP, velopharynx ; TB, tongue base ; UES, upper esophageal sphincter

Table 2. The comparisons of pharyngeal pressure parameters after the chin-down maneuver between healthy subjects and dysphagic patients. .

	Thin fluid			Thick fluid		
	Control (n=20)	Patient (n=59)	p value	Control (n=10)	Patient (n=15)	p value
Max. pressure of VP (mmHg)	-4.1 (34.1)	12.3 (44.0)	0.687	-8.6 (41.3)	0.4 (33.0)	0.567
Area of VP contraction.	-3.6 (19.2)	0.8 (16.3)	0.227	-1.1 (12.0)	-3.4 (14.6)	0.849
Max. pressure of TB contraction (mmHg)	-14.9 (26.9)	-13.5 (29.9)	0.840	-4.0 (10.8)	-19.0 (38.2)	0.567
Area of TB contraction	-8.6 (18.1)	-8.6 (24.3)	0.769	-7.1 (8.9)	-7.5 (15.1)	1.000
Pre-swallow peak UES pressure (mmHg)	13.8 (91.3)	0.6 (57.6)	0.094	6.5 (112.1)	-2.2 (42.3)	0.367
Max. low pharyngeal peak pressure (mmHg)	42.7 (71.5)	5.1 (81.8)	0.807	55.6 (90.3)	10.2 (83.7)	0.216
Post-swallow peak UES pressure (mmHg)	32.4 (92.5)	10.7 (50.4)	0.010	28.1 (59.0)	16.0 (63.1)	0.807
Min. UES pressure (mmHg)	-2.4 (6.3)	-1.2 (5.7)	0.429	-3.6 (4.1)	4.5 (19.9)	0.115
UES activity time (msec)	0.03 (0.08)	0.0 (0.18)	0.032	0.04 (0.12)	0.07 (0.14)	0.461
UES nadir duration (msec)	0.06 (0.09)	0.01 (0.10)	0.243	0.07 (0.08)	0.04 (0.05)	0.461

Mean was estimated by average of pre(neutral)-post(chin-down) difference value.

p value on thin fluid was calculated by Student's t-test, and p value on thick fluid was calculated by Mann-Whitney test.

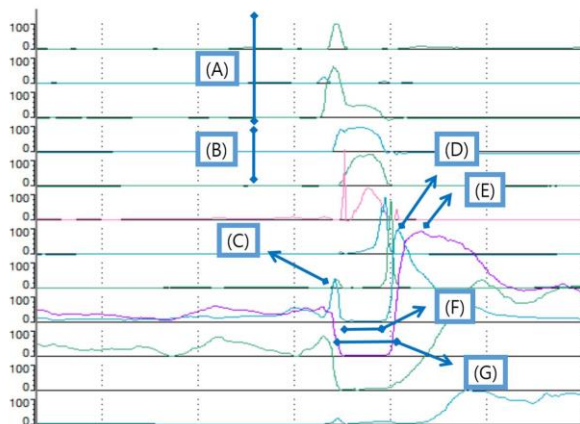


Fig.1 High resolution manometry parameters ; (A) velopharynx, (B) tongue base, (C) pre-swallow UES peak (D) low pharyngeal peak, (E) Post-swallow UES peak, (F) UES Nadir duration, (G) UES activity time (pre-UES peak to post-UES peak)

Fig.1 High resolution manometry parameters