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Marshmallow

Clinical Significance of Marshmallow Esophagography in Patients with Nutcracker Esophagus and Ineffective Esophageal Motility

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Background/Aims: Ineffective esophageal motility (IEM) and a nutcracker esophagus can lead to hypocontractile dysmotility and hypercontractile dysmotility, respectively. We evaluated patients for the abnormalities of marshmallow esophagography and we compared the esophageal symptoms with the esophageal manometric findings in the patients. **Methods:** We included total 96 patients; there were 23 patients with IEM, 36 patients with nutcracker esophagus, 37 individuals with esophageal symptoms who remained in the normal esophageal manometric group, and 9 asymptomatic healthy controls. The distal esophageal body pressure and the lower esophageal sphincter pressure were examined with respect to the grade of marshmallow esophagography. **Results:** The nine healthy volunteers displayed no abnormal marshmallow transit. However, 43.5% of the patients with IEM and 36% of the patients with nutcracker esophagus displayed abnormal marshmallow transit. There was a statistical difference between the healthy volunteer group and those patients with nutcracker esophagus or IEM ($p < 0.05$). Abnormal marshmallow esophagography occurred more frequently for the non-transmitted contraction and the combined type of IEM (non-transmitted contraction and low-amplitude contraction) ($p < 0.05$). However, there was no difference between the distal esophageal pressure and the grade of the marshmallow esophagography. Furthermore, nutcracker esophagus did not display any significant relationship with the distal esophageal pressure and the lower esophageal sphincter pressure with respect to the grade of the marshmallow esophagography. **Conclusions:** Although the measurement of the distal esophageal pressure and the lower esophageal sphincter pressure did not provide statistically significance for the marshmallow transit in IEM and the nutcracker esophagus, the non-transmitted contraction and the combined type provided a statistically significant result for IEM. (*Kor J Neurogastroenterol Motil* 2005;11:20-27)

Key words: Marshmallow esophagography, Ineffective esophageal motility, Nutcracker esophagus

서 론

1

2-4

45% marshmallow
, marshmallow

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5

marshmallow

가

(p<0.05).⁵

marshmallow

가 , 23 (11 , 12 , 40)

가 .⁵ 180 mmHg

36 (20 , 16 , 43)

가 marshmallow

9

marshmallow

1

가 ,

가

37 (17 ,

가 , 20 , 42)

2.

1)

.⁶

3 cm 8 cm

30 mmHg

가

30%

(ineffective esophageal motility,

IEM)

(hypocontractile motility disorder)

2)

.⁷

marshmallow

90°

8

4

4

5, 10, 15, 20 cm

가 , IEM
(hypercontractile motility disorder)

ESM3 8R (Andorfer Medical Specialties, Greendale, Wisconsin, U.S.A)

8 channel low compliance pneumohydraulic capillary infusion system

marshmallow

1 0.6 mL

PC polygraph HR (Synectics Medical, Stockholm, Sweden)

pull through

rapid

대상 및 방법

1.

1995 3 2003 8

3) Marshmallow

(prone position)

20 mm marshmallow

(Handycam

23 , 36 ,

9 ,

Pro CCD-VX1, Sony, Japan)

37

1

marshmallow

marshmallow

.^{5,6} Marshmallow

1

marshmallow

, 30

Marshmallow가 (impaction) marshmallow (standing position) marshmallow marshmallow 30 6 (p<0.05).

30 (Table 1, 2).

2. Marshmallow

3. marshmallow 9 marshmallow 23 10 (43.5%) marshmallow (p<0.05).

marshmallow Fisher's exact test marshmallow 37 7 (18.9 %)

Wallis test Wilcoxon Two-sample test Kruskal-Wallis test (p<0.05).

3. marshmallow

결 과 1. marshmallow marshmallow 4 4 3 (75%), marshmallow 6 1 (16.7%), 13 6 (46.2%) 가

Table 1. Correlation between Grade of Marshmallow Transit and Symptoms in Nutcracker Esophagus

Symptom	No. of subjects	Grade of marshmallow transit				No. of abnormal transit(%)	p-value
		Normal	Mild	Moderate	Severe		
Dysphagia	5	2	1	1	1	3 (60)	0.328
Chest pain	15	11	4	0	0	4 (26.6)	0.318
Globus sense	6	3	3	0	0	3 (50)	0.645
Dysphagia+Chest pain	3	3	0	0	0	0 (0)	0.288
Chest pain+Globus sense	3	2	2	0	0	1 (33.3)	1.000
Dysphagia+Globus sense	4	2	1	0	1	2 (50)	0.609

by Fisher's exact test.

Table 2. Correlation between Grade of Marshmallow Transit and Symptoms in Ineffective Esophageal Motility

Symptom	No. of subjects	Grade of marshmallow transit				No. of abnormal transit(%)	p-value
		Normal	Mild	Moderate	Severe		
Dysphagia	6	4	0	1	1	2 (28.6)	0.660
Chest pain	6	6	0	0	0	0 (0)	0.019
Globus sense	3	0	1	1	1	3 (100)	0.067
Chest pain+Globus sense	2	1	0	1	0	1 (50)	1.000
Dysphagia+Chest pain	2	1	0	1	0	1 (50)	1.000
Dysphagia+Globus sense	1	0	1	0	0	2 (100)	0.434
Dysphagia+Globus sense +Chest pain	3	1	1	0	1	2 (66.6)	0.559

by Fisher's exact test.

Table 3. Comparison of Marshmallow Esophagography according to the Manometric Diagnosis

Manometric Diagnosis	No. of subjects	Grade of marshmallow transit				No. of abnormal transit(%)
		Normal	Mild	Moderate	Severe	
Symptomatic normal motility	37	30	4	2	1	7 (18.9)
Asymptomatic normal group	9	9	0	0	0	0 (0)
Nutcracker esophagus	36	23	8	3	2	13 (36.1)*
IEM	23	13	1	3	6	10 (43.5) ^{††}

IEM, ineffective esophageal motility.

* p=0.0423, compared to asymptomatic healthy volunteer subjects by Fisher's exact test.

[†]p=0.0303, compared to asymptomatic healthy volunteer subjects by Fisher's exact test.

^{††}p=0.0307, compared to symptomatic normal motility subjects by Fisher's exact test.

marshmallow
45.9 mmHg, 34.9 mmHg
(p<0.05).
marshmallow 가
(p<0.05). (Table 5).
marshmallow 가 (Table 6).
고 찰
, marshmallow 3 (nonspecific esophageal
cm 50.6 mmHg, 8 cm 33.6 mmHg motility disorder, NEMD)

Table 4. Comparison of Marshmallow Esophagography according to the Manometric Abnormalities in patients with Ineffective Esophageal Motility

Manometric abnormalities	No. of subjects	Grade of Marshmallow transit				No. of abnormal transit(%)
		Normal	Mild	Moderate	Severe	
Non-transmitted contraction	4	1	1	2	0	3 (75.0) ^{*†}
Low-amplitude contraction	6	5	0	0	1	1 (16.7)
Combined type	13	7	0	1	5	6 (46.2) [‡]

combined type (non-transmitted and low-amplitude contraction).

*p=0.043, compared to asymptomatic healthy volunteer subjects by Fisher's exact test.

†p=0.032, compared to symptomatic normal motility subjects by Fisher's exact test.

‡p=0.046, compared to asymptomatic healthy volunteer subjects by Fisher's exact test.

Table 5. Correlation between Grade of Marshmallow Transit and Esophageal Body Pressure in Ineffective Esophageal Motility

Grade of Marshmallow transit	No. of subjects	Mean Pressure	Mean Pressure	LES pressure
		in 8cm above LES	in 3cm above LES	
Normal	13	33.6±26.1	50.6±34.5	22.8±5.7
Moderate	4	48.7±17.0	45.0±16.6	24.9±6.5
Severe	6	25.7±14.2	46.5±27.8	26.9±8.7

LES, lower esophageal sphincter.

pressures are expressed as mean±standard deviation (mmHg).

Pressure in 8 cm above LES: Wilcoxon two-sample test, p=0.9157.

Pressure in 3 cm above LES: T-test, p=0.9127.

가
(ineffective esophageal motility, IEM)
(hypocontractile motility disorder)
7,15,16 NEMD
IEM
IEM
Fouad 16
NEMD 347 331 (95.4%) IEM, 11
(3.2%)
17
1,345 249 (18.5%) IEM
NEMD IEM
가
가
marshmallow
가

가 , 가 가 .

가 요 약

marshmallow

IEM marshmallow 가

10 marshmallow : ,

marshmallow 23 ,

가 36 , 9 ,

(volume clearance) 37 marshmallow

가 22,23 ,

IEM marshmallow

(volume clearance) : 9

가 marshmallow

(severity) , 43.5%,

가 36.1% marshmallow

(p<0.05).

18.9%

가 가 ,

(p<0.05).

marshmallow

(+

) 75%, 46.2%

marshmallow

가

marshmallow

marshmallow

Marsh-

marshmallow

marshmallow

: Marshmallow , ,

marshmallow

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