Esophageal Motility Disorders Frequency in Patients with Pulmonary Disorders: A Retrospective Study.

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Abstract

Introduction: The relationship between esophageal and pulmonary diseases has been extensively studied, however, despite the increasing interest in understanding this bi-directional relationship, a lot remains to be elucidated. Given the significant morbidity and mortality often associated with some pulmonary disorders, an understanding of the pathophysiological mechanisms involved in this interaction is extremely important. This study further explores the relationship among various esophageal and pulmonary disorders.

Methods: This is a retrospective study of patients who underwent high resolution esophageal manometry (HREM) and pH studies at the Yale Gastrointestinal and Motility Lab between 2016 and 2019. Data was extracted from the electronic medical record after studies were reviewed by two motility specialists using the Chicago Classification v. 4.0. A total of 1078 patients were divided into five groups according to the presence of four pulmonary diagnoses: asthma (270); obstructive sleep apnea (OSA, 160); interstitial lung disease (ILD, 59); chronic obstructive pulmonary disease (COPD, 74); control (no pulmonary diagnosis, 565).

Results: The prevalence of ineffective esophageal motility (IEM) was significantly higher in ILD, asthma, and OSA patients compared to control (22.7, 18.5, 20.0 and 12.9%, respectively). Moreover, the incidence of absent contractility was four times greater in ILD patients than control patients. No statistical difference was found in frequency of motility disorders between COPD and control patients. Demeester score was higher in both OSA (36.1) and asthma (40.9) patients than in the control group (24.7) and proton pump inhibitor (PPI) was more effective in decreasing the score in these two groups.

Discussion: The prevalence of motility disorders is higher in patients with pulmonary diseases. Screening those populations with HREM and pH testing with impedance (when available) can promote bi-directional benefits and improve chronic cough management in this group.

Patient Demographics

Table 1.

	normal	asthma	OSA	ILD	COPD
Age; mean ± SEM, yr	53.4 ± 0.7	53.1 ± 0.9	56.6 ± 0.9*	62.4 ± 2.2**	64.6 ± 1.4**
n	(565)	(269)	(159)	(59)	(74)
BMI; mean ± SEM, kg/m²	28.2 ± 0.3	31.0 ± 0.5**	34.6 ± 0.7**	29.1 ± 1.0	28.9 ± 0.8
n	(543)	(270)	(157)	(59)	(74)
Female frequency; n (%)	368 (65.1)	220 (81.5)**	120 (75.0)*	33 (55.9)	48 (65.8)

Patient's age and BMI were compared to the normal group using Student's t-test. *p < 0.05; **p < 0.001. A chi-square test of independence was performed to examine the relation between gender and pulmonary diagnosis

Chicago Classification (v4) among patients with different pulmonary diagnosis

Table 2.

	Pulmonary diagnosis frequency				
Chicago Classification	Normal (N= 565)	Asthma (N= 270)	OSA (N= 160)	ILD (N=59)	COPD (N= 74)
EGJOO					
n	83	34	19	5	12
%	14.69%	12.59%	11.88%	8.47%	16.22%
Achalasia I					
n	3	0	0	0	0
%	0.53%	0%	0%	0%	0%
Achalasia II					
n	31	9	4	0	4
%	5.49%	3.33%	2.50%	0%	5.41%
Achalasia III					
n	10	3	0	1	1
%	1.77%	1.11%	0%	1.69%	1.35%
Absent contractility					
n	19	12	6	10	4
%	3.36%	4.44%	3.75%	16.95%*	5.41%
IEM					
n	73	50	32	14	13
%	12.92%	18.52%*	20.00%*	23.73%*	17.57%
Jackhammer					
n	16	9	8	2	5
%	2.83%	3.33%	5.00%	3.39%	6.76%
DES					
n	9	7	5	1	0
%	1.59%	2.59%	3.13%	1.69%	0%
Normal					
n	321	146	86	26	35
%	56.81%	54.07%	53.75%	44.07%	47.30%

Comparison between the groups were performed using Fischer's exact test.*p < 0.05

Comparison of HREM Metrics among patients with different pulmonary diagnosis

Table 3.

	Normal	Asthma	OSA	ILD	COPD
LES pressure (IRP basal)	30.42 ± 0.96	28.33 ± 1.11	28.02 ± 1.55	24.56 ± 2.04	30.19 ± 1.90
n	(564)	(270)	(160)	(59)	(74)
LES pressure (IRP residual)	11.17± 0.44	9.64 ± 0.50*	9.24 ± 0.66*	9.02 ± 0.94	11.94 ± 1.25
n	(564)	(267)	(160)	(59)	(74)
DCI	2412 ± 288.9	2130 ± 158.5	2251 ± 217.5	2060 ± 272.1	2542 ± 398.9
n	(504)	(240)	(144)	(45)	(70)
Distal latency	7.01 ± 0.09	6.88 ± 0.17	6.83 ± 0.15	7.03 ± 0.28	7.11 ± 0.34
n	(379)	(185)	(102)	(37)	(47)
UES pressure (basal)	66.66 ± 1.45	61.02 ± 2.13*	61.14 ± 3.57	71.39 ± 7.52	54.69 ± 5.29*
n	(565)	(270)	(160)	(59)	(74)
UES pressure (residual)	3.00 ± 1.05	1.33 ± 0.38	3.14 ± 0.43	2.00 ± 0.63	4.04 ± 0.67
n	(565)	(270)	(160)	(59)	(74)

The HREM parameters of the four pulmonary disease groups (asthma, OSA, ILD and COPD) were compared to the normal group using Student's t-test. *p < 0.05

PPI Effect among different pulmonary diagnosis

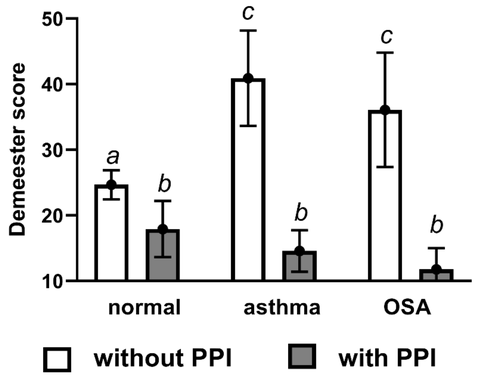

Figure 1. Different letters mean averages were significantly different. *p < 0.05

BMI effect on demeester score

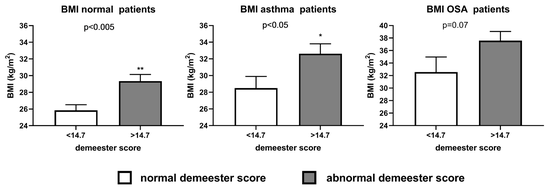

Figure 2. BMI levels differences between normal demeester score group and abnormal demeester score were compared using Student's t-test.

Conclusions

- The IEM prevalence is higher in patients with asthma, OSA and ILD compared to patients without pulmonary diseases.
- ILD patients have higher prevalence of absent contractility compared to patients without pulmonary disorders.
- PPI seems to be more efficient in reducing the demeester score in patients with asthma and OSA compared to normal patients.
- Patients with elevated demeester score have higher BMI compared to the group with normal demeester score.
- More data is necessary to explore what pH studies parameters are different among the 5 pulmonary groups in patients with similar BMI.
- Screening these populations with HREM and pH testing with impedance (when available) can promote bi-directional benefits and improve chronic cough management in this group.
- Future studies can identify if the risk for esophageal motility disorders in patients with pulmonary diseases is dependent on the severity of the latter.

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