The Relationship Between Number of Proximal Events on Esophageal Impedance and Laryngopharyngeal Symptoms

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Introduction

- Atypical symptoms of GERD also known as laryngopharyngeal reflux symptoms (LPR) are vague and are often attributed to other diagnoses.
- Multichannel intraluminal impedance testing is an alternative to standard 24-48 hour pH monitoring which can detect both acid and nonacid reflux events and determine if the reflux reaches the proximal esophagus (Full column events).
- Few studies have addressed whether proximal events noted during esophageal impedance testing are a reliable predictor of LPR symptoms, and no large studies exist that investigate whether the number of proximal events on impedance testing could be used to guide management of these patients with atypical symptoms.
- The primary aims of this study are to:

1) **Assess if the number of proximal events recorded during multichannel intraluminal impedance testing correlate with LPR symptoms**
2) **Assess if the number of proximal events could be used to help predict the degree of symptom improvement after Anti-Reflux Surgery.**

Methods

- The study cohort included patients within single institution database that were over 18 years of age, had filled out a Reflux Severity Index (RSI) score questionnaire, and who had undergone multichannel intraluminal impedance pH testing from June 2009 to January 2021 (n=92).
- The cohort was divided into two groups according to their RSI score using the standard definitions of >13 as abnormal and </=13 as normal. We compared these two groups' characteristics (Table 1A), and then each groups' findings on impedance studies (Table 2A).
- The same patient cohort was divided by the number of proximal events using a previously suggested normal value of <31, and abnormal of >/=31 (6). We compared their characteristics (Table 1B, 2B) and preoperative LPR symptom pattern (Table 3B). We performed a Pearson correlation coefficient calculation to determine if a relationship existed between (Figure 1).
- A subset of patients was identified who underwent an anti-reflux procedure (Nissen or Toupet fundoplication) (n=42). The change in preoperative to postoperative RSI scores were compared between those with a normal and those with abnormal number of proximal events (Figure 2).

Results

Table 1A: Grouped by Preoperative Reflux Severity Score

	RSI ≤ 13 (n=28)	RSI >13 (n=64)	p value
Age, mean (SD)	52.5 (15.07)	51.(13.32)	0.728
Sex			
Male, n (%)	50	29.7	0.062
Female, n (%)	50	71.3	
Race*			
White, n (%)	100	94.7	1.000
Black, n (%)	0	2.6	
Other, n (%)	0	2.6	
Evaluation Reason			
Dysphagia, n (%)	7.1	7.8	0.945
Pain, n (%)	10.7	7.8	
Reflux, n (%)	71.4	75.0	
Other, n (%)	10.7	9.4	
BMI (SD)	28.7 (5.19)	29.2 (4.96)	0.672
GERD HRQL Score* (SD)	13.4 (8.02)	18.7 (10.37)	0.024
DeMeester Score* (SD)	17.6 (17.77)	13.4 (16.77)	0.331
Hiatal Hernia on EGD, n (%)	65.4	48.3	0.145

*=missing data

Table 1B: Grouped by Number of Proximal Events on Impedance Study

	Full Column Events < 31 (n=65)	Full Column Events ≥ 31 (n=27)	p value
Age (SD)	51.5 (14.47)	52.5 (12.27)	0.753
Sex			
Male, n (%)	33.9	40.7	0.530
Female, n (%)	66.2	59.3	
Race*			
White, n (%)	97.1	95.2	0.614
Black, n (%)	2.9	0	
Other, n (%)	0	4.8	
Evaluation Reason			
Dysphagia, n (%)	9.2	3.7	0.599
Pain, n (%)	10.8	3.7	
Reflux, n (%)	70.8	81.5	
Other, n (%)	9.2	11.1	
BMI (SD)	28.7 (5.05)	29.9 (4.90)	0.310
GERD HRQL Score* (SD)	16.3 (10.65)	19.0 (8.11)	0.256
DeMeester Score* (SD)	13.9 (2.51)	16.5 (3.05)	0.543
Hiatal hernia on EGD, n (%)	53.3	53.9	0.965
Preoperative RSI Score (SD)	19.8 (9.76)	19.7 (9.03)	0.935
	Full Column Events < 31 (n=29)	**Full Column Events ≥ 31 (n=16)**	
Change in RSI Score Preop to postop (SD)	-12.1 (10.11	-10.5 (10.39)	0.569

*=missing data

Table 2A: Reflux events on Impedance Studies

	RSI </=13 (n=28)	RSI >13 (n=64)	p value
All Reflux Events (normal= < 73) (SD)	72.96 (41.49)	74.85 (46.61)	0.867
Acid Reflux Events (SD)	30.68 (23.39)	27.87 (26.38)	0.630
Non-Acid Reflux Events (SD)	37.54 (41.43)	43.16 (32.08)	0.494
Impedance Full Column Events (normal= < 31) (SD)	33.32 (39.47)	25.23 (23.47)	0.320

Table 2B: Reflux events on Impedance Studies

	Full Column Events < 31 (n=65)	Full Column Events ≥ 31 (n=27)	p value
All Reflux Events (normal= < 73) (SD)	59.43 (35.60)	103.2 (47.04)	0.0001
Acid Reflux Events (SD)	22.73 (19.79)	42.78 (31.30)	0.630
Non-Acid Reflux Events (SD)	34.85 (27.00)	56.52 (46.15)	0.494

Results (cont.)

Table 3B: Preoperative RSI Symptom Severity

Symptoms	Full Column Events < 31 (n=65)		Full Column Events ≥ 31 (n=27)		p value
	None-Mild	Mod-Severe	None-Mild	Mod-Severe	
Hoarse Voice, n (%)	50.8	49.2	55.6	44.4	0.819
Throat Clearing, n (%)	38.5	61.5	33.3	67.7	0.813
Mucous Production, n (%)	36.9	63.1	48.2	51.8	0.356
Annoying Cough, n (%)	56.9	43.1	51.9	48.1	0.818
Choking, n (%)	64.6	35.4	77.8	22.2	0.324
Globus, n (%)	40.0	60.0	48.2	51.8	0.496
Heartburn/Chest pain, n (%)	53.9	46.2	22.2	77.8	0.006
Dysphagia, n (%)	81.5	18.5	81.5	18.5	1.000
Cough with food/supine, n (%)	49.2	50.8	44.4	55.6	0.819

Figure 1: Proximal Events vs RSI Score

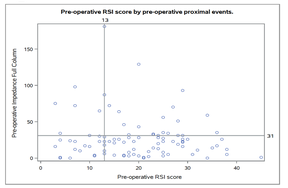
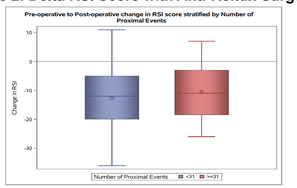


Figure 2: Delta RSI Score with Anti-Reflux Surgery



Conclusions

- No difference in number of proximal reflux events between patients with normal and abnormal RSI scores
- No significant difference in laryngopharyngeal symptom pattern between patients with normal and abnormal number of reflux events on impedance pH study
- No correlation between number of proximal events on multichannel intraluminal impedance testing and the severity of laryngopharyngeal symptoms.
- No significant difference in improvement of RSI score after anti-reflux surgery (Nissen, Toupet).
- **This suggests that multichannel intraluminal impedance pH testing may not be useful in counseling patients prior to anti-reflux surgery.**

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