



Introduction

- Gastroesophageal Reflux Disease (GERD) affects 40% of US
- Symptoms include heartburn, regurgitation, sore throat, cough, dysphagia
- Workup includes a swallow study, EGD, pH study, manometry
- Patient reported outcomes (PROs) such as health related quality of life (HRQL) questionnaires that are integral to monitor treatment outcomes and direct clinical decision making
- GERD specific PROs most commonly used during surgical evaluation in western countries (see below)
 - GERD-HRQL (1997) - burden of common symptoms
 - LPR-RSI (2002) – burden of upper respiratory symptoms

GERD –HRQL SCORING SCALE	No symptoms	Symptoms noticeable but not bothersome	Symptoms noticeable and bothersome but not every day	Symptoms bothersome every day	Symptoms affect daily activities	Symptoms are incapacitating – unable to do activities
1. How bad is your heartburn?	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
2. Heartburn when lying down?	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
3. Heartburn when standing up?	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
4. Heartburn after meals?	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
5. Does heartburn change your diet?	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
6. Does heartburn wake you from sleep?	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
7. Do you have difficulty swallowing?	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
8. Do you have pain with swallowing?	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
15. Do you have abdominal bloating or distention?	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
23. If you take reflux medications, does this affect your daily life?	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

LPR - RSI SCORING SCALE	No symptoms	Symptoms noticeable but not bothersome	Symptoms noticeable and bothersome but not every day	Symptoms bothersome every day	Symptoms affect daily activities	Symptoms are incapacitating – unable to do activities
1. Hoarseness or other voice problems	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
2. Clearing throat	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
3. Excess throat mucus or postnasal drip	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
4. Difficulty swallowing food, liquid, or pills	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
5. Coughing after eating	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
6. Breathing difficulties or choking episodes	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
7. Troublesome or annoying cough	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
8. Sensations of something sticking in throat /lump in throat	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
9. Heartburn, chest pain, indigestion, stomach acid coming up	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

Background

- Anti-reflux surgery (ARS) is the most successful treatment of GERD in select patients
- Treatment outcomes are measured with objective physiologic studies and subjective PROs
- Patients with underlying mood disorders, depression and anxiety are more likely to have GERD, and exhibit worse preoperative PRO less subjective improvement postoperatively
- EHAS (2019) is a PRO focused on anxiety, worry and hypervigilance surrounding GERD symptoms/frequency
 - Validated in patients treated with medical therapy only
 - Higher EHAS has positive correlation with certain HRQLs

EHAS Scoring Scale	0 = Strongly Disagree	1 = Somewhat Disagree	2 = Neither Agree nor Disagree	3 = Somewhat Agree	4 = Strongly Agree
1. I can't seem to keep my symptoms out of my mind	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
2. I have a difficult time enjoying myself because I cannot get my mind off the discomfort in my throat/chest/esophagus.	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
3. These symptoms are awful and they overwhelm me.	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
4. As soon as I awake, I worry that I will have discomfort in my throat/chest/esophagus during the day.	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
5. I often worry about problems in my throat/chest/esophagus.	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
6. These symptoms are terrible and I think things are never going to get any better.	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
7. There is nothing I can do to reduce the intensity of my symptoms.	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
8. When I feel discomfort in my throat/chest/esophagus, it frightens me.	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
9. I anxiously want the symptoms to go away.	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
10. I am quick to notice changes in the location or extent of my esophageal symptoms.	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
11. I am aware of sudden or temporary changes in my esophagus.	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
12. I notice my symptoms even if I am busy with another activity.	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
13. I focus on esophageal sensations.	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
14. I am very sensitive to esophageal sensations such as heartburn or chest pain.	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
15. I keep track of my symptom levels.	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4

Hypothesis

We hypothesize that patients with higher EHAS scores have significantly elevated GERD-HRQL and LPR-RSI compared to those with normal scores

Methods

- Retrospective review of demographics and survey scores
- 237 patients (39% men, average age 56) completed all three surveys
 - Both preoperative and postoperative EHAS
 - Only preoperative GERD-HRQL and LPR-RSI
- Designed to establish correlation between baseline surveys, not post intervention changes
- Bivariate analysis to determine variables with impact on preoperative surveys
- Multivariable linear regression for interactions with $p < 0.05$

Results

Variables	GERD-HRQL	P value	LPR-RSI	P value
Age in years	-0.14	0.04	-0.08	0.23
Women	23 ± 1.0		17 ± 0.77	<0.01
Men	18 ± 1.1	<0.01	14 ± 0.90	<0.01
EHAS	0.48	<0.01	0.29	<0.01
GERD-HRQL	-	-	0.57	<0.01
LPR-RSI	0.57	<0.01	-	-

Bold indicates statistically significant difference; Pearson and Spearman correlation indicated by r . Continuous variables as mean +/- standard deviation; EHAS = Esophageal Hypervigilance Anxiety Scale ; GERD-HRQL = Gastroesophageal Reflux Disease-Health Related Quality of Life ; LPR-RSI = Laryngopharyngeal Reflux Symptom Index

Dependent variables	Retained variables	Regression coefficient [β] (95% CI)	P value	Adjusted R ²
GERD-HRQL	Age in years	-0.03 (-0.12 to 0.05)	0.48	0.24
	Men compared to women	-3.17 (-5.86 to -0.48)	0.021	
	EHAS	0.31 (0.23 to 0.39)	<0.001	
LPR-RSI	Men compared to women	-3.08 (-5.38 to -0.78)	0.009	0.10
	EHAS	0.15 (0.08 to 0.22)	<0.001	

Bold indicates correlation coefficient for variables of interest. EHAS = Esophageal Hypervigilance Anxiety Scale; GERD-HRQL = Gastroesophageal Reflux Disease-Health Related Quality of Life ; LPR-RSI = Laryngopharyngeal Reflux Symptom Index

Discussion

- We suspected there was an effect, but we lacked an efficient way to evaluate disease specific psychologic and somatic contributors on patient perceptions of symptoms severity.
- Recognizing that symptoms of anxiety, hypervigilance and depression contribute to poor outcomes scores despite the proven effectiveness of anti-reflux surgery should shift our focus towards improving the preoperative evaluation and enhance patient engagement
- Inclusion of the EHAS into an evidence-based decision support tool could help segment the GERD population to identify those who would most likely benefit from surgery and direct preoperative therapies like CBT, intensive counseling, or medications.

Future Directions

- EHAS study remains a novel outcome measure requiring further study
- This study retrospectively compiled EHAS scores both before and after surgery, based on the assumption that scores would not vary over time. This assumption must be evaluated by future studies asking does the score change with treatment
- To determine the utility of EHAS as a decision making tool, future longitudinal studies focusing on preoperative outcomes matched to PRO survey changes will help determine if surgical intervention improves the subjective outcomes that matter to the patient

References

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