Personalized Anti-Reflux Surgery: Connecting GERD Phenotypes in 690 Patients to Outcomes

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Introduction

- Despite standardized surgical techniques to treat GERD, variability in post-operative outcomes persists
- Most patients with GERD possess one or more characteristics that augment their disease and may affect post-operative outcomes. A combination of these characteristics represent a GERD "phenotype"
- We identified and described patients with the most common GERD phenotypes and then compared their post-operative outcomes

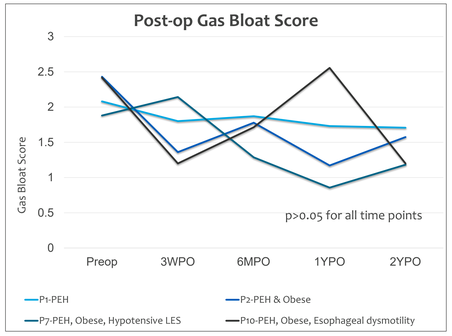
Methods

- Retrospective review of a prospectively maintained quality foregut database at NorthShore University HealthSystem in Evanston, IL
- We selected all patients who underwent an anti-reflux procedure for GERD, including ARMS (anti-reflux mucosectomy), magnetic sphincter augmentation (MSA), and fundoplication (Nissen, Toupet, Dor)
- Patients were grouped into different phenotypes based on the presence of four characteristics known to play a role in GERD: hiatal or paraesophageal hernia (PEH), hypotensive LES, esophageal dysmotility, delayed gastric emptying (DGE), and obesity
- We then compared patient reported outcomes (GERD-HRQL, dysphagia, gas bloat, and reflux symptom index (RSI) scores) across phenotypes using the Wilcoxon rank-sum test

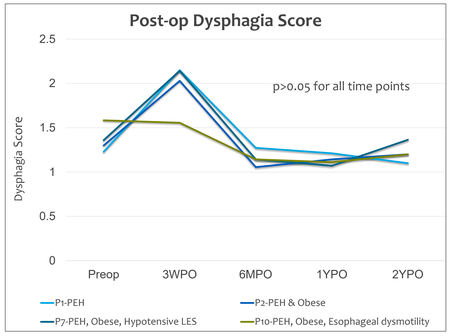
Patient Demographics and Clinical Data	
Total Patients, N	690
Age, years [Mean ± SD]	65 ± 12
BMI [Mean ± SD]	29.2 ± 4.6
Obese [N (%)]	269 (39.0)
Female [N (%)]	472 (68.4)
Current smoker [N (%)]	16 (2.3)
Ineffective Esophageal Motility [N (%)]	165 (23.9)
Preop Demeester Score [Median Q1-Q3)], N=252	31.1 (19.1-51.0)
Demeester > 14.7 [N (%)]	213 (84.5)
Hernia Type [N (%)]	
None	78 (11.3)
HH/Type I	214 (31.0)
PEH/Type II-IV	398 (57.7)
Hernia Size [Mean ± SD], N=269	5.4 ± 3.5
Hypotensive LES [N (%)]	226 (32.8)
DGE [N (%)]	20 (2.9)
Surgery Type [N (%)]	
Nissen	337 (48.8)
Toupet/Dor	277 (40.1)
MSA	45 (6.5)
ARMS	31 (4.5)
Intraoperative Complication [N (%)]	24 (3.5)
LOS, days [Median (Q1-Q3)]	1 (1-2)
30 Day Mortality [N (%)]	2 (0.3)
30 Day Complication [N (%)]	65 (9.4)
30 Day ED Visit [N (%)]	79 (11.4)
30 Day Readmission [N (%)]	49 (7.1)
Postop Off PPI [N (%)], N=520	422 (81.2)
Symptom Resolution [N (%)]	
Heartburn, N=368	296 (80.4)
Dysphagia, N=248	161 (64.9)
Regurgitation, N=325	270 (83.1)
Cough, N=173	107 (61.8)
Epigastric Chest Pain, N=179	127 (70.9)
Recurrence [N (%)]	66 (9.6)
Follow-up, months [Median (Q1-Q3)]	21 (9-46)

Abbreviations: BMI=Body Mass Index; HH=hiatal hernia; PEH=paraesophageal hernia; LES=lower esophageal sphincter; MSA=magnetic sphincter augmentation; ARMS=anti-reflux mucosectomy; LOS=Length of Stay; ED=emergency department; PPI=proton pump inhibitors; 3WPO=three weeks postop; 6MPO=six months postop; 1YPO=one year postop; 2YPO=two years postop; RSI=reflux symptom index; GERD-HRQL=GERD-health related quality of life

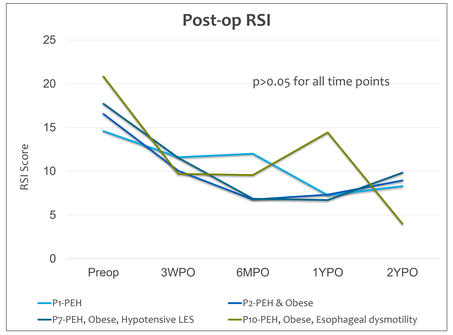
Description of Most Common GERD Phenotypes						
Phenotype Rank	*Hernia Type*	*Hypotensive LES*	*Esophageal Motility*	*DGE*	*Obesity*	*n (%)*
1	**Type II-IV**	**No**	**Normal**	**No**	**No**	**134 (24)**
2	**Type II-IV**	**No**	**Normal**	**No**	**Yes**	**105 (19)**
3	Type I	No	Normal	No	No	56 (10)
4	Type II-IV	Yes	Normal	No	No	46 (8)
5	Type I	Yes	Normal	No	No	39 (7)
6	Type I	No	Normal	No	Yes	36 (6)
7	**Type II-IV**	**Yes**	**Normal**	**No**	**Yes**	**33 (6)**
8	Type II-IV	No	Ineffective	No	No	27 (5)
9	No Hernia	No	Normal	No	No	22 (4)
10	**Type II-IV**	**No**	**Ineffective**	**No**	**Yes**	**21 (4)**
11	Type I	Yes	Ineffective	No	No	20 (4)
All DGE	-	-	-	Yes	-	20 (4)



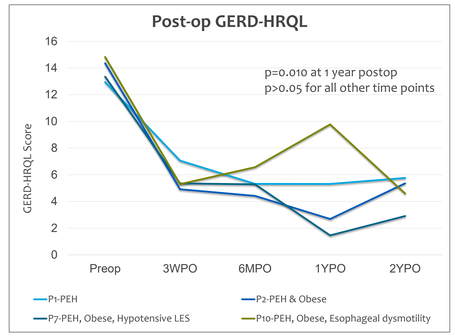
Scale: 0=No symptoms 1=Symptoms noticeable but not bothersome
2=symptoms noticeable and bothersome but not daily
3=Symptoms bothersome every day 4=Symptoms affect daily activity
5=Symptoms are incapacitating



Scale: 1=No dysphagia 2=Able to swallow some solid foods
3=Able to swallow only semi-solid foods 4=Able to swallow liquids only
5=Unable to swallow anything



Scale: 0=No symptoms 45=severe laryngopharyngeal reflux
>13=laryngopharyngeal reflux



Scale: 0=No symptoms 50=severe symptoms

Summary Results

- Non-obese patients with normal esophageal motility, normotensive LES, no DGE, with a PEH represented the most common phenotype (134 (24%), phenotype #1)
- Obese patients with a hypotensive LES and a paraesophageal hernia had the lowest post-operative GERD-HRQL scores at one year (1.5±2.4, p=0.010, phenotype #7)
- Obese patients with ineffective esophageal motility and a paraesophageal hernia had the highest post-operative GERD-HRQL scores at one year (9.8 ± 11.4, p=0.010, phenotype #10)
- There was no statistically significant difference in RSI, dysphagia, gas bloat, or GERD-HRQL scores between phenotypes after five years

Conclusion

- We have identified distinct GERD phenotypes which may predict post-operative outcomes after anti-reflux surgery in the short term
- With further study, GERD phenotypes may help surgeons prognosticate long and short-term outcomes for patients considering a procedure to treat their GERD

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