

Prevalence and Clinical Significance of Esophagogastric Outflow Obstruction (EGJOO) in Patients with Gastroesophageal Reflux Disease (GERD)

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Background: Gastroesophageal Reflux Disease (GERD) is defined by typical and/or atypical reflux symptoms with abnormal acid exposure, Barrett's esophagus, or erosive esophagitis. Esophagogastric junction outflow obstruction (EGJOO) describes manometrically a lower esophageal sphincter (LES) dysfunction diagnosed during high resolution esophageal manometry (HREM). Chicago Criteria defines EGJOO as the LES's inability to relax appropriately based on Integrated Relaxation Pressure (IRP). Pressure > 15 mmHg indicates dysfunction. Although considered gold standard for diagnosing esophageal motility disorders, Chicago Classification does not consider factors affecting LES function. Clinical significance of EGJOO in patients with GERD is unclear. **Methods:** Prospectively collected data from 364 patients seen in tertiary referral center were analyzed. GERD-HQRL and RSI questionnaires, endoscopy, CINE-esophagram, pH testing and endoscopic functional luminal imaging were performed as clinically indicated, and compared with the final diagnosis of EGJOO after considering anatomic changes and upright swallow measurements during HREM to determine if swallows in the upright position corrected IRP. Patient characteristics were further analyzed. **Results:** Of the 364 patients evaluated, 147 had confirmed GERD and HREM. Of those, 64 had abnormal HREM (Figure 1). 31/64 (48%) patients had abnormal HREM suggesting EGJOO. In these 31 patients (Table 1), review of the HREM showed that 21 performed upright swallows; 14(67%) had IRP corrected suggesting HREM artifact (Figure 1). The other 7 patients (33%) with upright swallows had unchanged IRP confirming true EGJOO. 4/7 (57%) were classified as "mechanical" EGJOO (prior Nissen fundoplication, hiatal hernia) and 3(44%) were true functional EGJOO. **Conclusions:** EGJOO is a manometric abnormality diagnosed in confirmed GERD patients evaluated with HREM. Upright swallows normalized the abnormal IRP in two thirds of EGJOO. Based upon these data, pH testing and routine upright swallows during HREM may minimize the misdiagnosis of EGJOO in the setting of confirmed GERD. Prospective validation of this approach is needed.

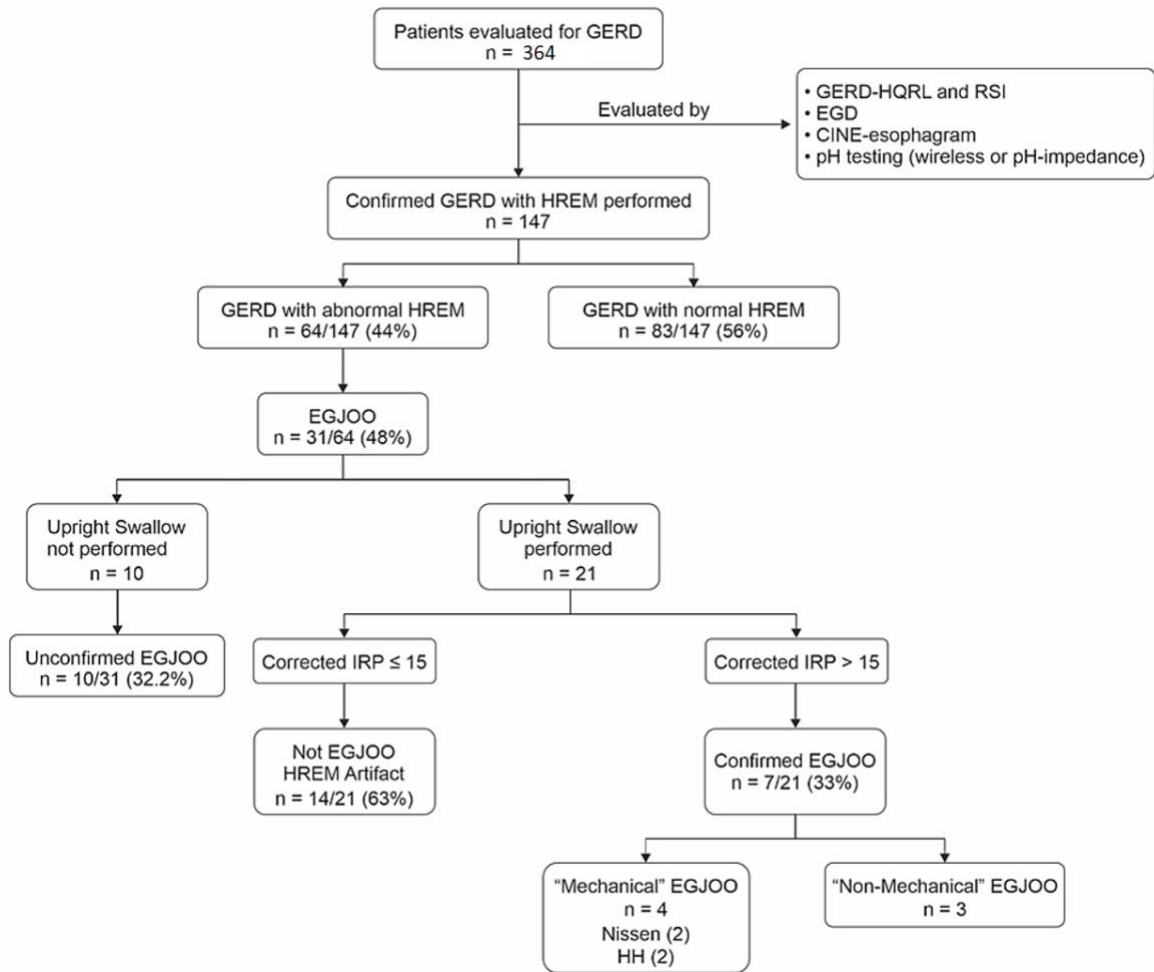


Figure 1: flow diagram of GERD patients diagnosed with EGJOO.

Table 1: Patient Characteristics

	EGJOO (n=31)
Age, mean \pm SD	55 \pm 12.1
Gender, n (%)	
Male	13 (41.9%)
Female	18 (58.1%)
BMI, mean \pm SD	28.4 \pm 7.4
IRP basal, median (IQR)	20.6 (6.4)
On opiates, n (%)	4 (12.9%)
Hiatal hernia length (cm), n (%)	
1 cm	6 (19.3%)
2 cm	6 (19.3%)
>3 cm	2 (6.4%)
Prior Nissen fundoplication, n (%)	5 (16%)
HREM findings, n (%)	
EGJOO	20 (64.6%)
EGJOO + IEM	1 (3.2%)
EGJOO + Jackhammer esophagus	1 (3.2%)
EGJOO + HH	9 (29%)

TITLE: PATIENTS WITH INEFFECTIVE ESOPHAGEAL MOTILITY UNDERGOING MAGNETIC SPHINCTER AUGMENTATION DEMONSTRATE OUTCOMES SIMILAR TO PATIENTS WITH NORMAL ESOPHAGEAL MOTILITY

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Introduction: Many patients with GERD have associated dysmotility such as ineffective esophageal motility (IEM) that may affect outcomes of Magnetic sphincter augmentation (MSA). We aimed to evaluate outcomes of MSA in patients with IEM.

Methods: This is a multi-institutional, retrospective study, of patients with IEM, defined by Chicago classification 3, undergoing MSA from 2012-2017. Cases were matched to non-IEM patients on sex, BMI, presence of Barrett's, hiatal hernia size and method of hiatal closure. Dysphagia was defined as a score of >3 on the difficulty swallowing item on the GERD-HRQL survey.

Results: A total of 106 patients with IEM underwent MSA. The IEM group GERD-HRQL score improved from 22 to 4 ($p < 0.001$) and DeMeester score improved from 33 to 8 ($p < 0.001$) at 1 year, similar to the non-IEM group (Table 1).

At 1 year, in the IEM group, 14/17 (82%) patients had resolution of dysphagia; 3/17 (18%) had persistent dysphagia; 9/68 (13%) had new onset dysphagia and 59/68 (87%) never had dysphagia. A similar trend was observed in the non-IEM group (Figure 1).

From 2012-2017, 23 (22%) IEM patients were dilated after MSA, compared to 27 (27%) non-IEM patients ($p = 0.33$). Seven (7%) IEM vs 6 (6%) non-IEM patients had their device explanted. Compared to the explanted non-IEM patients, the explanted IEM patients had lower preop DCI of 195.5, lower preop dysphagia rates (14% vs 50%), higher preop DeMeester scores 46.3 vs 35.5 and a shorter duration of symptoms, 95 vs 157 months.

Conclusion: MSA in IEM patients demonstrates comparable rates of symptomatic and objective GERD improvement. Resolution of baseline dysphagia and rates of developing new onset

dysphagia were similar. The need for postoperative dilation and explantation were similar. IEM, therefore, should not preclude use of MSA in patients with GERD.

Word count: 292/300 words

Table 1. Patient demographics, with pH testing and quality of life outcomes

	IEM	Non-IEM	p-value
Age, mean (SD)	49.4 (15.4)	53.4 (14.6)	0.06
BMI, mean (SD)	26.5 (4.1)	27 (4.2)	0.39
Duration of symptoms, mean (SD)	120.9 (105.1)	144.9 (113.6)	0.16
Male, n (%)	63 (59.4%)	55 (56.1%)	0.63
Female, n (%)	43 (40.6%)	43 (43.9%)	0.63
Dysphagia, n (%)	18 (18.9%)	23 (24%)	0.39
Preoperative GERD-HRQL score, median (IQR)	22 (14 - 34)	25 (16 - 36)	0.69
Postoperative GERD-HRQL score at 1 year, median (IQR)	4 (2 - 11)	5 (2 - 9)	0.75
Preoperative total DeMeester score, median (IQR)	33 (21.4 – 47.6)	28.65 (18 – 45.9)	0.22
Postoperative total DeMeester score at 1 year, median (IQR)	8.2 (3.2 – 25.2)	7.5 (2.8 – 20.6)	0.86

SD = standard deviation, IQR = Interquartile range

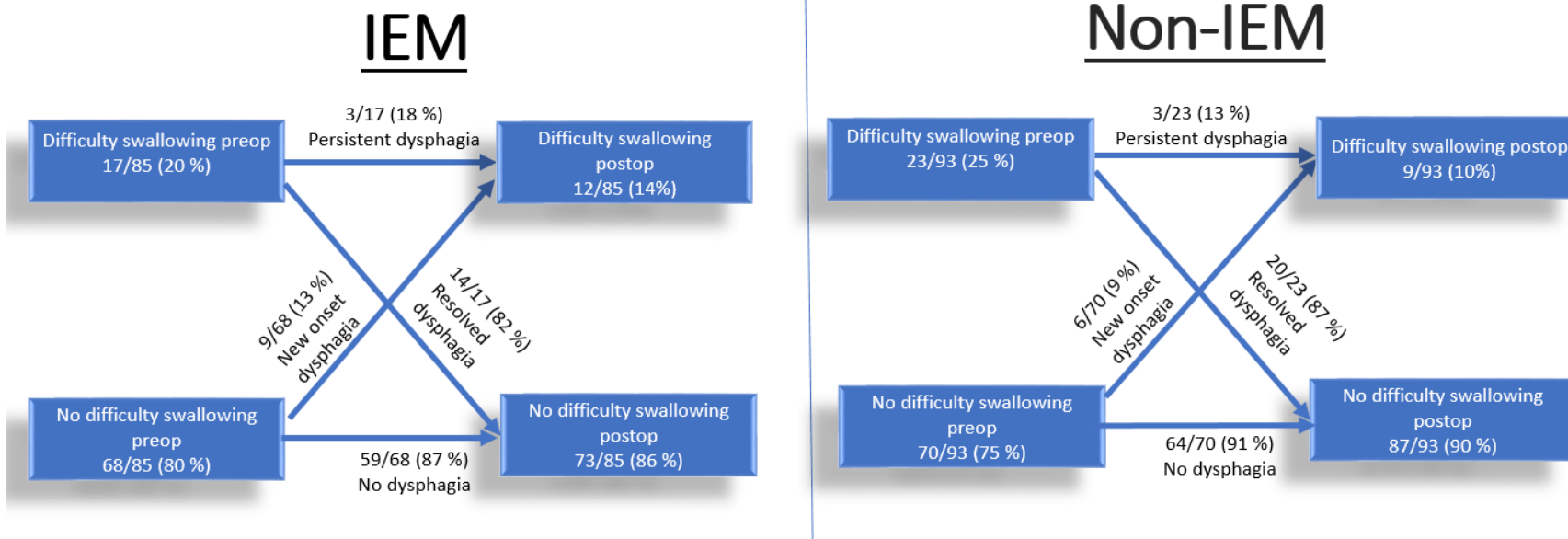


Figure 1: Evolution of dysphagia symptoms preoperatively and postoperatively as assessed by the GERD-HRQL. Dysphagia is considered present where there is a score of >3 for the difficulty swallowing question on the survey.

ADVANCED IMPEDANCE METRICS ON IMPEDANCE-PH TESTING PREDICT LUNG FUNCTION DECLINE AT 1 YEAR IN IDIOPATHIC PULMONARY FIBROSIS PATIENTS

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Background: Gastro-esophageal reflux (GER) has been associated with idiopathic pulmonary fibrosis (IPF). Mean nocturnal baseline impedance (MNBI) is a marker of esophageal mucosal integrity, while post-reflux swallow-induced peristaltic wave (PSPW) index reflects the efficacy of esophageal refluxate clearance. Both metrics offer novel ways to assess reflux burden, but their role in evaluating extraesophageal GER remains unclear.

Aim: To assess the relationship between MNBI and PSPW index on multi-channel intraluminal impedance-pH testing (MII-pH) and lung function decline over 1 year in IPF patients.

Methods: Adults with IPF undergoing pre-lung transplant MII-pH off acid suppression at a tertiary center were enrolled. Pulmonary function test (PFT) data was collected at the time of MII-pH and at 1-year follow-up. MNBI was calculated by averaging baseline impedance at three 10-minute time intervals (1AM, 2AM, 3AM), and classified as proximal (channels 15-17 cm above LES) and distal (channels 3-9 cm above LES). PSPW was defined as a peristaltic swallow propagating through the esophagus within 30 seconds of a reflux event. PSPW index was calculated by dividing total PSPW events by total reflux episodes. Data were analyzed using student's t-test/Pearson's correlation for univariate and linear regression for multivariate analyses.

Results: 125 subjects (mean age=61.7 years, 62% male) were included. Significantly greater decline in FEV1 and FVC at 12 months were seen in subjects with lower distal MNBI, proximal MNBI, and PSPW index (Table 1). On multivariate analyses controlling for gender, age and baseline lung function, distal MNBI, proximal MNBI, and PSPW index all remained independently associated with greater FEV1 and FVC decline (Table 2).

Conclusion: Low distal MNBI, proximal MNBI, and PSPW index were independent predictors of more severe lung function decline over 1 year in IPF patients. These advanced impedance metrics may have prognostic value and supports a role for reflux in IPF pathogenesis.

Table 1: Univariate analyses of impedance metrics on MII-pH and change in PFT findings in 12 months. **(A)** Pearson’s correlations between impedance metrics and PFT changes showed that distal MNBI, proximal MNBI, and PSPW index all significantly correlated with FEV1 change, percent FEV1 change, FVC change, and percent FVC change in 12 months. **(B)** When impedance metrics are dichotomized per previously published cutoffs (Frazzoni 2014), low distal MNBI (<2292 Ω), low proximal MNBI (<2292 Ω), and low PSPW index (<50%) correlated with more significant decline in PFT findings in 12 months.

A	FEV1 Change in 12 months	FEV1 % Change in 12 months	FVC Change in 12 months	FVC % Change in 12 months
Distal MNBI	R=0.573, p=0.0066	R=0.565, p=0.0076	R=0.550, p=0.010	R=0.506, p=0.019
Proximal MNBI	R=0.471, p=0.010	R=0.532, p=0.013	R=0.510, p=0.018	R=0.562, p=0.008
PSPW Index	R=0.596, p=0.007	R=0.626, p=0.004	R=0.544, p=0.016	R=0.554, p=0.014
B	FEV1 Change in 12 months	FEV1 % Change in 12 months	FVC Change in 12 months	FVC % Change in 12 months
Low Distal MNBI (<2292 Ω) vs Normal	0.19 L/min vs -0.095 L/min p=0.028	7.429% vs -1.786% p=0.016	0.20 L/min vs -0.11 L/min p=0.059	5.14% vs -0.929% p=0.091
Low Proximal MNBI (<2292 Ω) vs Normal	0.22 L/min vs -0.085 L/min p=0.029	8.50% vs -1.60% p=0.011	0.23 L/min vs -0.098 L/min p=0.050	6.50% vs -1.07% p=0.039
Low PSPW Index (<50%) vs Normal	0.34 L/min vs -0.074 L/min p=0.025	12.0% vs -0.94 p=0.015	0.33 L/min vs -0.084 L/min p=0.063	7.67% vs -0.375% p=0.064

Table 2: Multivariate linear regression models of impedance metrics on MII-pH and change in PFT findings in 12 months. Separate models were constructed for each impedance metric to avoid co-linearity.

A	FEV1 % Change in 12 months					
Covariates	β -coeff	p-value	β -coeff	p-value	β -coeff	p-value
Low Distal MNBI	-11.76	0.016	-	-	-	-
Low Proximal MNBI	-	-	-10.02	0.021	-	-
Low PSPW	-	-	-	-	-15.03	0.019
Age	3.34	0.438	5.64	0.202	-0.65	0.888
Male	5.72	0.244	-2.23	0.589	2.77	0.542

Smoking	-4.35	0.278	-3.25	0.430	-7.03	0.101
Baseline FEV1 % Predicted	0.020	0.846	-0.069	0.518	-0.02	0.848
B						
	FVC % Change in 12 months					
Covariates	β -coeff	<i>p</i> -value	β -coeff	<i>p</i> -value	β -coeff	<i>p</i> -value
Low Distal MNBI	-8.91	0.034	-	-	-	-
Low Proximal MNBI	-	-	-7.39	0.047	-	-
Low PSPW	-	-	-	-	-10.40	0.078
Age	4.90	0.193	6.36	0.102	2.24	0.600
Male	6.28	0.163	0.017	0.996	3.70	0.402
Smoking	-5.26	0.152	-4.43	0.243	-7.07	0.09
Baseline FVC % Predicted	-0.031	0.741	-0.93	0.356	-0.063	0.596

Hiatal Hernia Recurrence Following Magnetic Sphincter Augmentation and Cruroplasty: Long-Term Outcomes

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BACKGROUND: Magnetic sphincter augmentation (MSA) is an effective treatment option for gastroesophageal reflux disease (GERD). Initially, MSA was relatively contraindicated in patients with concomitant hiatal hernias > 3 cm. Short term data suggest that MSA with hiatal hernia repair may be equally effective. Our study aimed to evaluate long term MSA outcomes, with special attention to hiatal hernia recurrence.

METHODS: We performed a retrospective cohort study of all patients with GERD and intra-operative hiatal hernias between 2009 and 2015, who underwent MSA, hiatal hernia repair without mesh, and cruroplasty. All patients underwent videoesophagram and/or upper endoscopy at one year postoperatively, then annually for up to five years. Hiatal hernias > 2 cm were deemed clinically significant. The gastroesophageal reflux disease health-related quality of life (GERD-HRQL) survey was conducted at 3 months, 6 months, and annually.

RESULTS: There were 79 patients (37 male, 42 female). The mean age was 63.8. The mean follow-up was 2.3 years. At the time of latest follow-up, the mean GERD HRQL score was 5, from 20 preoperatively ($p < 0.05$, Wilcoxon signed rank test). There were two detected hiatal hernia recurrences > 2 cm (2.531%). At their last follow-up, 3 (4%) of patients had resumed proton pump inhibitors.

Preoperative Characteristics	
Body mass index (mean, SD)	26.32, 6.9300
GERD-HRQL (mean, SD)	20.29, 8.726
Preop DeMeester score (mean, SD)	50.04, 30.51
Intraoperative Characteristics	
Hiatal Hernia Size (cm), (mean, SD)	4.82, 1.23
Average OR duration in hours (mean, SD)	1.2849, 0.524
Post-operative Outcomes	
Endoscopic dilation, n (%)	16/79 (20.25%)
Postop DeMeester Score (mean, SD)	14.01, 17.51

Table 1: SD=Standard Deviation

CONCLUSIONS: Initial concerns about MSA with hiatal hernia repair are not supported. Our study demonstrates that MSA with cruroplasty is safe and results in excellent long-term outcomes.

IS THERE A NON-BARRETT'S PATHWAY TO ESOPHAGEAL ADENOCARCINOMA? IMPLICATIONS FOR SCREENING AND MANAGEMENT

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Background/Aims:

Barrett's esophagus (BE), defined by the presence of intestinal metaplasia (IM), is the only identifiable precursor lesion for esophageal adenocarcinoma (EAC). Recent studies have suggested the possibility of an alternate, non-IM pathway to EAC that is associated with a more aggressive EAC with worse survival.

Methods:

This was a retrospective cohort study of patients with EAC evaluated at a tertiary care center from 2009-2019. Cases were categorized according to the presence or absence of IM. We compared demographic characteristics, clinical stage, and therapy between the two groups. We used Cox proportional hazards regression to determine the association of IM with overall survival, adjusting for sex, age, proton pump inhibitor use, tumor location, and stage.

Results:

A total of 478 patients were included and 105 (22%) had no evidence of IM (**Table 1**). The non-IM-EAC group had a greater proportion of patients diagnosed with advanced disease (41 vs. 2% for stage 4, $p<0.001$) and gastroesophageal junction tumors (76 vs. 47%, $p<0.001$). As a result, they were less likely to undergo endoscopic therapy alone (0.95% vs. 30.56%, $p<0.001$) or surgery alone (0.95% vs. 9.65%, $p=0.003$). Although on univariate analysis, IM-EAC patients had improved overall survival compared to non-IM-EAC (HR 0.45, 95% CI 0.33-0.62) (**Figure 1**), the presence of IM-EAC was no longer significant on multivariable analysis (HR 0.89, 95% CI 0.62-1.26). Additional factors associated with survival were age at diagnosis, PPI use, and increasing stage of diagnosis (**Table 2**).

Conclusions:

Patients in the non-IM-EAC cohort are younger, and present with more advanced disease compared to IM-EAC patients. However, the absence of IM was not associated with overall survival and this was largely driven by stage at presentation. Future prospective studies with detailed molecular sequencing are required to clarify if a non-IM-EAC exists, which would have significant implications for screening and management strategies.

Table 1. Characteristics of individuals with (IM-EAC) and without (Non-IM-EAC) intestinal metaplasia

Characteristic	Total N=478	IM-EAC N=373 (78.03%)	Non-IM-EAC N= 105 (21.97%)	P value*
Survival, days, median (IQR)	607 (267-1224)	660 (295-1330)	424 (219-862)	<0.001
Age at diagnosis, mean \pm SD	64.79 \pm 10.78	65.48 \pm 10.46	62.36 \pm 11.57	0.0086
BMI, kg/m ² , mean \pm SD,	27.89 \pm 5.44	28.36 \pm 5.50	26.39 \pm 4.95	0.937
	N (%)	N (%)	N (%)	P value**
Gender				0.900
Male	425 (88.91)	332 (89.01)	93 (88.57)	
Female	53 (11.09)	41 (10.99)	12 (11.43)	
Race				0.732
White	424 (88.7)	329 (88.20)	95 (90.48)	
Black	3 (0.63)	3 (0.80)	0 (0)	
Asian	1 (0.21)	1 (0.27)	0 (0)	
Unknown	50 (10.46)	40 (10.72)	10 (9.52)	
Smoker				0.353
Non-smoker	162 (33.89)	131 (35.12)	31 (29.52)	
Former/Current	301 (62.97)	229 (61.39)	72 (68.57)	
Unknown	15 (3.14)	13 (3.49)	2 (1.90)	
Ethanol use				0.674
None	393 (82.22)	309 (82.84)	84 (80.00)	
Former/Current	65 (13.60)	48 (12.87)	17 (16.19)	
Unknown	20 (4.18)	16 (4.29)	4 (3.81)	
Family history EAC	20 (4.33)	15 (4.18)	5 (4.85)	0.944
Charlson Deyo Score				0.161
0	315 (65.90)	237 (63.54)	78 (74.29)	
1	96 (20.08)	78 (20.91)	18 (17.14)	
2	29 (6.07)	26 (6.97)	3 (2.86)	
3+	38 (7.95)	32 (8.58)	6 (5.71)	
PPI Use	271 (58.28)	234 (64.29)	37 (36.63)	<0.001
Cancer Location				<0.001
Esophageal	204 (42.68)	183 (49.06)	21 (20.00)	
GEJ	253 (52.93)	173 (46.38)	80 (76.19)	
Unknown	21 (4.39)	17 (4.56)	4 (3.81)	
Clinical Stage				<0.001
0	5 (1.05)	5 (1.34)	0 (0)	
1	125 (26.15)	124 (33.24)	1 (0.95)	
2A	6 (1.26)	6 (1.61)	0 (0)	
2B	25 (5.23)	24 (6.43)	1 (0.95)	
3	149 (31.17)	105 (28.15)	44 (41.90)	
4A	46 (9.62)	30 (8.04)	16 (15.24)	
4B	80 (16.74)	44 (11.80)	36 (34.29)	
Unknown	42 (8.79)	35 (9.38)	7 (6.67)	
Endoscopic Eradication	115 (24.06)	114 (30.56)	1 (0.95)	<0.001
Therapy alone				
Surgery alone	37 (7.74)	36 (9.65)	1 (0.95)	0.003
Neoadjuvant + surgery	151 (31.59)	110 (29.49)	41 (39.05)	0.063
Chemotherapy +/- radiation	111 (23.22)	66 (17.69)	45 (42.86)	<0.001
No treatment	2 (0.42)	0 (0)	2 (1.90)	0.008

*ANOVA test was used to assess differences among age groups for continuous variables

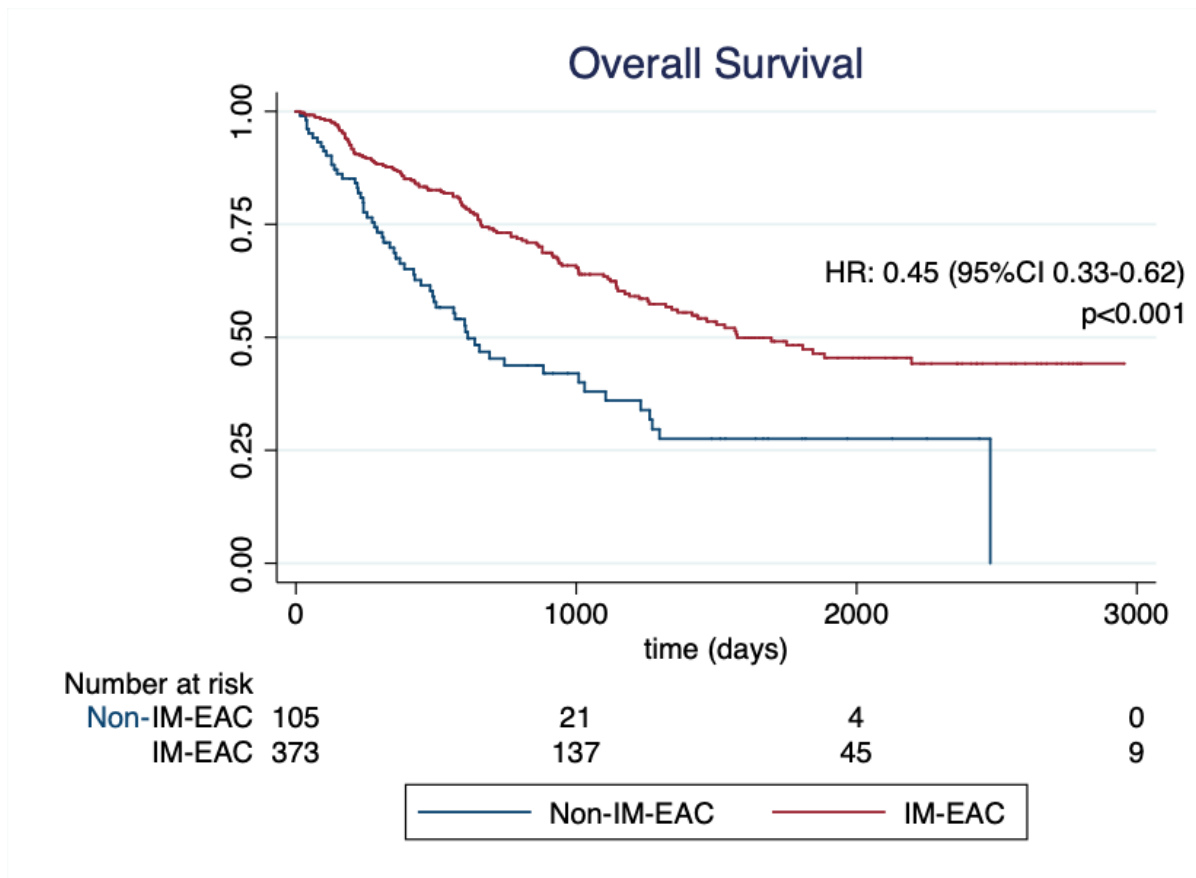
**Chi-square test was used to assess differences among age groups for categorical variables

Table 2. Univariate and Multivariate Survival Analysis

Characteristic	Univariate Analysis		Multivariable Analysis
	Hazard Ratio [95% CI]	P value	Adjusted Hazard Ratio [95% CI]
Smoker (ref: non)			--
Former/ Current	1.03 (0.76-1.40)	0.846	
Unknown	0.82 (0.37-1.80)	0.618	
Ethanol use (ref: none)			--
Former/ Current	1.59 (1.05-2.40)	0.27	
Unknown	1.22 (0.66-2.26)	0.530	
Family hx esophageal cancer			--
Yes	1.12 (0.59-2.12)	0.732	
Unknown	1.09 (0.41-2.95)	0.860	
Race (ref: white)			--
Black	1.49 (0.37-6.02)	0.575	
Asian	5.63 (0.78-40.55)	0.086	
Unknown	1.32 (0.82-2.16)	0.258	
Charlson Deyo Score (ref: 0)			--
1	1.37 (0.95-1.97)	0.089	
2	2.03 (1.24-3.34)	0.005	
3+	1.43 (0.86-2.39)	0.167	
Endoscopic Therapy alone	0.17 (0.10-0.29)	<0.001	--
Surgery alone	0.32 (0.15-0.68)	0.003	--
Neoadjuvant + surgery	0.79 (0.58-1.08)	0.133	--
Chemo +/- radiation	4.37 (3.24-5.90)	<0.001	--
No treatment	121.55 (25.05-589.64)	<0.001	--
Presence of BE/IM	0.45 (0.33-0.62)	<0.001	0.89 (0.62-1.26)
Age at diagnosis	1.00 (0.99-1.01)	0.867	1.02 (1.00-1.03)
Male Sex	1.51 (0.92-2.49)	0.104	1.17 (0.70-1.94)
PPI Use (ref: no)	0.49 (0.37-0.66)	<0.001	0.73 (0.53-0.997)
Location (ref: esophageal)			1.33 (0.95-1.87)
Gastroesophageal junction	1.82 (1.34-2.48)	<0.001	
Unknown	1.35 (0.67-2.73)	0.402	
Clinical Stage (ref: 1)			
2A	4.99 (1.48-16.82)	0.009	3.94 (1.07-14.55)
2B	2.75 (1.25-6.04)	0.012	2.26 (0.97-5.26)
3	3.70 (2.29-6.15)	<0.001	3.31 (1.91-5.76)
4A	6.77 (3.75-12.22)	<0.001	6.26 (3.38-11.76)
4B	11.01 (6.52-1860)	<0.001	9.82 (5.55-17.38)
Unknown	2.18 (1.10-4.31)	0.026	9.82 (5.55-17.38)

Multivariable analysis included

Figure 1. Overall survival of individuals with IM-EAC versus non-IM-EAC



HIGH RESOLUTION MANOMETRY IN A FUNCTIONING FUNDOPLICATION

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BACKGROUND

The Chicago classification was devised to provide guidance in interpreting High Resolution Manometry (HRM) in patients with esophageal dysphagia. However, it is unclear whether those values are applicable after fundoplication as the literature is sparse. The aim of this study was to provide a full HRM data set in patients with a normal functioning fundoplication.

METHODS

Patients who underwent primary laparoscopic fundoplication were identified from a prospectively collected database. All patients had preoperative pH testing and HRM. Postoperatively, a normal functioning fundoplication was defined by 1) normal acid exposure determined by esophageal pH-testing 2) no dysphagia reported on the standard questionnaire on the day of the postoperative HRM. Fifty patients met criteria and were included in the analysis. Paired t test was performed for analysis of pre- and postoperative changes, unpaired t test was performed for comparison of Nissen and Toupet fundoplication.

RESULTS

Postoperative testing was obtained at a median follow up of 12 months.

	PRE-OPERATIVE VALUES		POST-OPERATIVE VALUES		P VALUE
	MEDIAN	95 th PERC.	MEDIAN	95 th PERC.	
LES					
Total length, cm	3.3	4.8	3.95	4.4	0.0098
Resting pressure, mmHg	10.25	48.37	19.5	41.99	0.0263
IRP, mmHg	6	16	14	25.65	0.0001
EGJ CI, mmHg*cm	9.2	97.76	10.6	61.86	0.7032
ESOPHAGEAL BODY					
DCI, mmHg*cm*sec	696.85	2437.55	683.5	3383.4	0.7021
DECA, mmHg	64	157.65	63	131.7	0.6274
CFV, cm/sec	3	5.96	3	13.3	0.3176
DL, sec	7.6	10.27	8.29	11.09	0.0015
Peristaltic swallows, %	85	100	90	100	0.1367
Simultaneous swallows, %	0	20	0	30	0.7282
Failed swallows, %	20	65.5	20	95.5	0.2658
UES					
Resting pressure, mmHg	106.2	218.73	84.5	195.12	0.1526

Table 1: HRM parameters after laparoscopic fundoplication (n = 50)

Table 2 shows comparative values for Nissen and Toupet fundoplication, as well as a comparison of preoperative and postoperative values in those two subgroups. Median composite score for postoperative pH testing was 0.9. No significant difference between Nissen und Toupet fundoplication was found (p=0.1118).

	NISSEN (n = 33)			TOUPET (n = 17)			P VALUE N/T
	MEDIAN (95 th) PRE	MEDIAN (95 th) POST	P VALUE PRE/POST	MEDIAN (95 th) PRE	MEDIAN (95 th) POST	P VALUE PRE/POST	
LES							
Total length, cm	3.4 (5.24)	4 (4.4)	0.0971	3.2 (4.14)	3.7 (4.44)	0.0387	0.2963
Resting pressure, mmHg	13 (45.8)	20 (39.2)	0.1543	8 (46.6)	18 (46.18)	0.0841	0.7174
IRP, mmHg	6 (16)	15 (29.4)	0.0001	5 (16.06)	12 (23.2)	0.0003	0.3667
EGJ CI, mmHg*cm	12.09 (98)	12.91 (80.63)	0.6429	7.36 (85.26)	8.93 (61.47)	0.8778	0.2918
ESOPHAGEAL BODY							
DCI, mmHg*cm*sec	1016 (3203.8)	817 (3698.2)	0.4016	304 (1601.2)	348 (2353)	0.1072	0.0864
DECA, mmHg	75 (164.8)	66 (133.8)	0.3589	29 (101.6)	39 (113)	0.2914	0.0436
CFV, cm/sec	3 (6.1)	2.95 (11.5)	0.5413	3 (5.2)	3.6 (9.7)	0.3903	0.8656
DL, sec	7 (9.26)	8.4 (11.4)	0.0060	8.3 (14.88)	8 (10.16)	0.1622	0.5062
Peristaltic swallows, %	90 (100)	90 (100)	0.0503	70 (100)	70 (100)	1	0.3324
Simultaneous swallows, %	0 (20)	0 (42)	0.2719	0 (28)	0 (6)	0.1771	0.2492
Failed swallows, %	20 (54)	10 (54)	0.7807	30 (74)	40 (100)	0.2624	0.0060
UES							
Resting pressure, mmHg	124 (224.2)	81 (183.4)	0.0134	94.1 (189.58)	89.2 (218.4)	0.3497	0.2292

Table 2: HRM values after Nissen or Toupet fundoplication

CONCLUSION

This data provides useful guidance for using HRM in clinical management of dysphagia after fundoplication. As expected, the addition of a fundoplication significantly increases the LES measurements (total length, resting pressure, IRP). However, the previously accepted upper limit defining esophageal outflow obstruction (IRP > 15mmHg) is not clinically applicable after fundoplication as the majority of patients in this dysphagia-free cohort exceeded this value. Interestingly, there does not appear to be a difference in HRM LES values between Nissen and Toupet fundoplication.

The Impact of Body Mass Index on Recurrence Rates Following Laparoscopic Paraesophageal Hernia Repair

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Introduction:

Laparoscopic paraesophageal hernia repair (LPEHR) in obese patients is controversial, as obesity is a known risk factor for other types of hernia repairs. There is little debate that combining the operation with a concurrent weight loss procedure is optimal for patients with class III obesity. However, many patients who present with symptomatic paraesophageal hernias (PEH) are disinterested in, do not qualify for, or do not have insurance coverage for bariatric surgery. The aim of this study is to review the impact of body mass index (BMI) on hernia recurrence rates following LPEHR.

Methods:

All patients who underwent LPEHR between 2006-2012 were identified from a prospectively collected database. Inclusion criteria included elective repairs that had both non-permanent mesh reinforcement of the crural closure and fundoplication. Redo operations, Collis gastroplasty, and relaxing incisions were excluded. Concurrent bariatric surgery was routinely offered to patients with BMI \geq 35. Recurrence was defined on post-operative esophagram or endoscopy as $>$ 2cm of intrathoracic stomach. Chi-squared and Fischer's exact test were used to compare outcomes based on BMI stratification.

Results:

Three hundred and fifty patients met clinical criteria and 236 completed follow up evaluations. Radiographic (n=157) and/or endoscopic (n=132) follow-up was performed at a mean of 34 months (IQR 16-46 months). Hernia recurrence was significantly less frequent for normal weight individuals compared to the rest of the group (p=0.039) but there is no significant difference between BMI $<$ 35 and \geq 35 (p=0.882). Redo LPEHR was performed in 41% of recurrences (9.7% of total group).

Table1.

	All Patients n=236	Normal weight (BMI 18.5-24.9) n=37	Overweight (BMI 25-29.9) n=84	Class I Obesity (BMI 30-34.9) n=67	Class II Obesity (BMI 35-39.9) n=37	Class III Obesity (BMI \geq 40) n=11	p-value
BMI mean	30.46	22.61	27.60	32.15	37.25	43.49	
Recurrence Rate	23.7% (56/236)	10.8% (4/37)	30.9% (26/84)	23.9% (16/67)	24.3% (9/37)	18.1% (2/11)	0.197
Operative Complications	11.4% (27/236)	8.1% (3/37)	10.7% (9/84)	11.9% (8/67)	10.8% (4/37)	27.2% (3/11)	0.528

Conclusion:

Hernia recurrence rates after LPEHR are significantly improved for normal weight individuals. However, many patients requiring LPEHR do not meet bariatric surgery criteria, or do not want weight loss surgery. BMI alone should not be an exclusion criterion for patients with symptomatic PEH, but a preoperative weight loss program should be considered when clinically reasonable.

Robotic approach to paraesophageal hernia repair reduces long-term recurrence rates

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Abstract category: stomach-malignant or benign OR new technologies

Background: Recurrence rates for hiatal hernia repairs remains unacceptably high; as much as 56% in multi-center prospective trials. Robotic-assisted paraesophageal hernia (RPEH) repair offers a promising alternative to the traditional laparoscopic approach with improved mediastinal dissection and visualization, increased surgical dexterity, and enhanced surgeon ergonomics. However, the clinical effect of these potential advantages remains unknown. Here we describe the largest long-term study of the outcomes of patients undergoing RPEH.

Methods: This prospective study analyzed adult patients who underwent RPEH repair from 2009 to 2016 at a tertiary academic medical center. Long-term post-operative outcomes included radiographic evidence of PEH recurrence at 1 and 3 years post-operatively (as defined by an independent radiologist as $>2\text{cm}$); GERD-HRQL score; and PPI use.

Results: A total of 223 patients underwent RPEH repair during the study period. There was a relatively equal distribution of repair type (primary repair: 44% (89/223), recurrent repair: 56% (134/223)). A predominance of type III PEH were encountered and repaired (Type II: 4/223 (2%), Type III: 177/223 (79%), Type IV: 42/223 (19%)). At 1-year post-operatively, 152/223 (68%) of patients were available for follow-up and a radiographic recurrence rate of 3% (5/152) was seen. At 3-years post-operatively, 105/223 (47%) were available for follow-up and a radiographic recurrence rate of 8% (8/105) was seen.

Conclusion: This study presents the long-term outcomes of one of the largest robotic foregut surgical databases. The robotic approach to PEH repair can yield lower recurrence rates, in both primary and redo repairs. This may be due to extensive mediastinal dissection that is facilitated

with the robotic instrumentation as well as the lower pneumoperitoneum that is needed to maintain adequate visualization. Additional follow-up studies will help to determine if this benefit is sustained long-term.

Does Ineffective Esophageal Motility Have an Impact on Long-Term Outcomes Following Collis Gastroplasty and Fundoplication?

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Introduction: The impact of ineffective esophageal motility(IEM) on postoperative outcomes in patients undergoing repair of giant paraesophageal hernia(PEH) with Collis gastroplasty(CG) for short esophagus is not well-known. This study compares outcomes between patients with IEM and normal motility(NM) following PEH repair, fundoplication and CG.

Methods: From 2003-2018, an institutional database was studied to evaluate early post-operative(<4 weeks) and longer-term outcomes of patients who had pre-operative high resolution manometry(HRM) and had CG with and without IEM(DCI ≤ 450 or $\geq 50\%$ abnormal peristalsis). Demographics, pre/post-operative symptoms, length of stay(LOS), complications, and Quality of Life(QOL) data were studied utilizing the gastroesophageal reflux disease health-related QOL survey(GERD-QOL). Chi-square and fisher's exact tests were used to determine differences between groups.

Results: A total of 142 patients were identified; 36(25%) had IEM and 106(75%) had NM. Median long-term follow-up was 4.8 years. 25(70%) and 11(30%) patients with IEM underwent a partial and total fundoplication, respectively. A significant difference in preoperative regurgitation was found(IEM/normal; 29(80%)/51(48%), $p=0.04$). There was no difference in early postoperative symptomatology or complications between patients with IEM and NM. Patients with IEM demonstrated significant improvement in dysphagia, regurgitation, chest pain($p<0.0001$, $p<0.0001$, $p<0.03$, respectively). LOS was similar between groups(IEM/normal; 4.0/4.9 days, $p=0.1$). There was no difference in symptomatology, complications and LOS in patients with IEM undergoing partial vs. total fundoplication. At early and longer-term follow-up HRQL scores improved in all patients(IEM pre/post HRQL 19/1, $p=0.0001$ and NM 16/3, $p=0.0004$). There was no difference in mean HRQOL scores between the IEM and NM groups at long term follow-up($p=0.12$)(Figure 1). There was no difference in HRQL scores at longer-term follow-up between patients with IEM who underwent partial versus total fundoplication(8.5 vs. 1.6, $p=0.07$). At longer-term follow-up, 37% of patients with IEM and 35% of patients with NM were using acid reduction therapy(ns).

Conclusion: CG and fundoplication can be performed safely in patients with IEM and giant PEH with excellent post-operative outcomes.

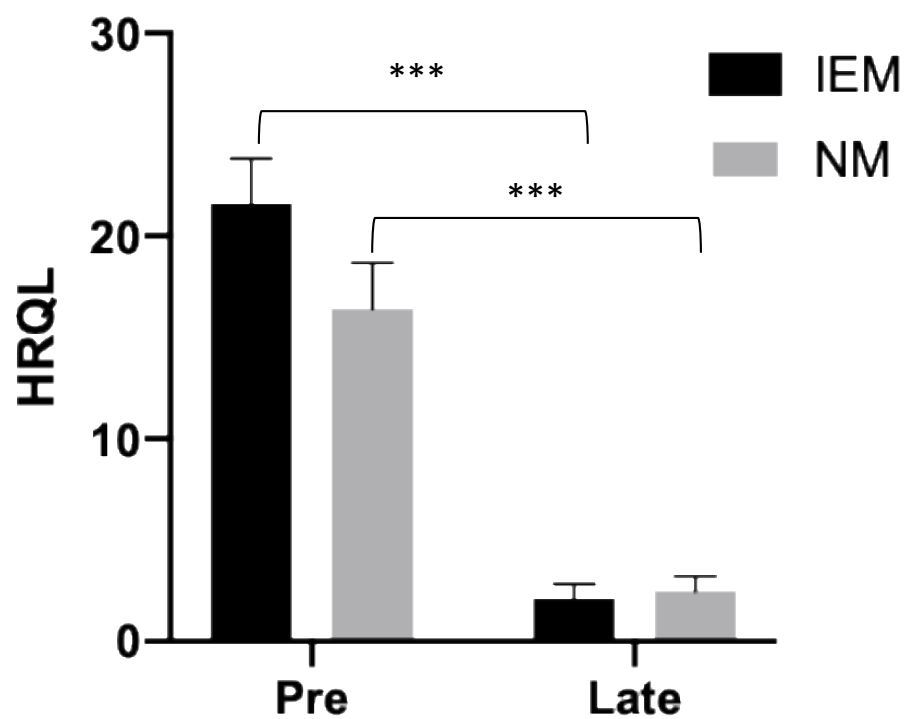


Figure 1: HRQL scores in patients with IEM and NM at early(pre) and longer-term follow up(late).

Larger Sizing of the Magnetic Sphincter Augmentation LINX® Device Reduces Need for Endoscopic Dilation or Device Removal

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Background

Magnetic sphincter augmentation (MSA) is an effective surgical option for gastroesophageal reflux disease (GERD), with long-term data supporting its safety. Nevertheless, postoperative dysphagia necessitating dilation has a prevalence of up to 30%. Our group increased the relative size of the LINX® device used on each patient beginning January 1, 2018. We hypothesized that this change would reduce post-operative interventions without affecting efficacy of the device.

Methods

All LINX® implantation procedures performed at two tertiary care institutions were retrospectively reviewed. Background demographics, preoperative GERD workup variables, including the GERD health-related quality of life (GERD-HRQL) score, and postoperative outcomes were reviewed. Larger sizing was defined as three sizes greater than the point at which the magnetic bond on the sizing device broke, ie “three over pop” versus the standard “2 over pop.” Chi square tests were used for categorical variables. T-test or Kruskal-Wallis rank sum test were used for continuous variables depending on distribution. A multivariable logistic regression model was created to assess need for postoperative endoscopic dilation.

Results

Demographics, preoperative, and postoperative details comparing the two cohorts are shown in Table 1. There was no difference in operative times between the two groups (1.68 vs 1.57 hours). The mean follow-up was longer in the larger device group (595 vs 127 days, $p < 0.001$). On multivariable regression, device sizing, preoperative dysphagia, and concurrent hiatal hernia repair were found to be significant predictors of postoperative dilation (Table 2).

Table 1: Demographics and Outcomes

Variable	Larger LINX®	Smaller LINX®	p-value
n	167	517	
Age, years (mean (SD))	54.83 (14.72)	55.05 (15.73)	0.89
Male Gender (n (%))	73 (55.3)	247 (53.5)	0.783
Body Mass Index (mean (SD))	24.08 (11.44)	22.61 (10.63)	0.156
Follow Up in Days (mean (SD))	126.90 (140.48)	594.69 (566.60)	<0.001
Preop Dysphagia (n (%))	53 (43.4)	167 (36.6)	0.203
Preop Demeester Score (mean (SD))	40.12 (24.56)	45.27 (27.84)	0.653
Preop HRQL Score (mean (SD))	26.21 (12.39)	18.66 (8.39)	<0.001
Postop HRQL Score (mean (SD))	8.95 (9.60)	11.84 (14.74)	0.301
PPI Usage at Last Follow up (n (%))	5 (12.5)	101 (22.1)	0.222
Postop Dilation (n (%))	18 (13.4)	101 (22.4)	0.032
Device Removal (n (%))	3 (1.8)	47 (9.1)	0.003

Table 2: Multivariable Logistic Regression Model Examining Need for Dilation

Variable	Odds Ratio (95% Confidence Interval)	p-value
Preoperative Dysphagia	2.83 (1.12-7.46)	0.01
Concurrent Hiatal Hernia Repair	0.358 (0.126-1.06)	0.055
Smaller MSA	3.31 (1.17-9.16)	0.02

Conclusion

Use of a larger-sized LINX® device is associated with decreased postoperative endoscopic dilations and device explantations while maintaining similar effectiveness for reflux control.

Title: Collis Gastropasty Reduces PEH Recurrence Rates

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Background

Hernia recurrence after paraesophageal hernia (PEH) repair remains a common problem. Tension on the repair likely contributes to the high rate of hernia recurrence. Collis gastroplasty (CG) addresses the axial tension by lengthening a foreshortened esophagus. The aim of this study was to evaluate whether CG reduces recurrence rates after PEH repair.

Methods

All patients undergoing elective PEH repair between January 2016 and December 2018 were reviewed. Cruroplasty was performed using resorbable mesh. CG was performed using a wedge fundectomy technique at the discretion of the operating surgeon. Patients who underwent CG were offered an EGD at 3 months to assess for esophagitis. All patients had an UGI at 1 year. Patients without follow up EGD or UGI were excluded. Recurrences were determined by EGD or UGI and defined as any size hernia.

Results

The study group was 245 patients and 86 underwent CG (35%). There were no post-operative leaks related to the CG. The median follow-up was 12 months. At 3-month endoscopy, 19 CG patients (22%) had esophagitis; 9 LA Grade A, 5 Grade B, 4 Grade C, and 1 Grade D. Only 5 patients (26%) with esophagitis reported dysphagia. Of the 19 patients with esophagitis, 11 had a subsequent endoscopy; 7 had improvement or resolution on PPIs, 3 were stable and 1 worsened. There were significantly fewer recurrences in patients that had a CG (6/86 [7%] vs 37/159 [23%], $p = 0.016$). Esophagitis was not associated with hernia recurrence.

Conclusions

Collis gastroplasty led to fewer hernia recurrences and is recommended when esophageal length is inadequate. High recurrence rates in patients without CG suggest that esophageal shortening is likely underappreciated in this patient population. Approximately a fifth of patients will have esophagitis after CG and endoscopy post-op is recommended since a minority of patients will report symptoms.

Endoluminal functional lumen imaging probe (EndoFLIP) for Post-POEM follow-up: A prospective study evaluating clinical success and distensibility index

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Background:

Clinical improvement after Per-Oral Endoscopic Myotomy (POEM) can be measured by Eckardt score (ES) and with objective data from high-resolution esophageal manometry (HRM) and/or a timed barium esophagram, both of which have poor patient tolerance and compliance. Endoluminal functional lumen imaging probe (EndoFLIP) is an alternative diagnostic modality that has a potential role in post-POEM follow-up. The aim of this study was to assess the distensibility index (DI) on EndoFLIP after POEM and 2) correlation between ES and DI.

Methods:

This was a prospective study of patients from 11/2017-11/2019 who had EndoFLIP assessment after POEM. The 16-cm EndoFLIP-322N balloon catheter was advanced across the gastro-esophageal junction under endoscopic guidance and the balloon distended to 60mL where DI and diameter were measured. DI >2.8 mm²/mm Hg was considered as adequate treatment. Clinical success of POEM was defined as post procedure ES ≤3 with a dysphagia component ≤2. Pre and post POEM ES were compared using a paired t-test.

Results:

33 patients were enrolled in the study (**Table**). Clinical success after POEM was 97% (32/33) with significant improvement in ES (mean decreased from 6.91 ± 1.94 pre-POEM to 0.88 ± 0.99 post-POEM, p<0.001). 30 patients (91%) achieved a post procedure DI >2.8. Reflux esophagitis was seen in 12/33 (36%) patients and there was no difference in mean DI in those with versus without esophagitis (5.73 ± 1.81 versus 5.22 ± 1.88, p=0.78.) There were two (6.1%) adverse events related to POEM (ER visit for chest pain with negative workup) and none associated with EndoFLIP.

Conclusions:

These results suggest that sedated upper endoscopy with EndoFLIP may be useful in evaluating response to POEM and examining for esophagitis. Additional data, specifically for patients with clinical failures, are needed to elucidate if ES correlates with DI.

Table. Characteristics of individuals who underwent POEM and subsequent EndoFLIP

Baseline Characteristics (n=33)	
Female sex, n (%)	18 (54.55)
Age, years, mean (range)	54.12 (22-82)
Indication, n (%)	
Type I achalasia	4 (12.12)
Type II achalasia	19 (57.58)
Type III achalasia	6 (18.18)
Esophago-gastric junction outflow obstruction	4 (12.12)
Integrated Relaxation Pressure, mm Hg, median (IQR)	29 (22.2, 35.5)
Prior Achalasia Treatment, n (%)	
None	21 (63.64%)
Pneumatic Dilation	2 (6.06%)
Botulinum toxin injection	5 (15.15%)
Surgical Heller myotomy	5 (15.15%)
Eckardt Score, mean \pm SD	6.91 \pm 1.94
Eckardt Score, median (IQR)	7 (6,8)
Adverse Events	2 (6.06%)*
Post Intervention Characteristics (n=33)	
Eckardt Score, mean \pm SD	0.88 \pm 0.99
Eckardt Score, median (IQR)	1 (0,2)
Clinical Success, n (%)	32 (97%)
Time to EndoFLIP, days, median (IQR)	92 (87,99)
Reflux esophagitis (LA Grade), n (%)	
None	21 (63.64)
A	4 (12.12)
B	5 (15.15)
C	1 (3.03)
D	2 (6.06)
EGJ Distensibility Index, 60mL mm ² /mm Hg, mean \pm SD	5.41 \pm 1.84
Minimum Diameter at 60mL, mm, mean \pm SD mm	12.12 \pm 1.84

*Emergency room visit for chest pain with negative workup

Risk of malnutrition and Body Mass Index in patients with achalasia

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Background

Weight loss is traditionally considered a primary feature of achalasia. However, there is lack of information regarding the nutritional status of achalasia patients. Aim of this study was to assess the malnutrition risk and to determine predictive factors of malnutrition in patients with achalasia.

Methods

A retrospective cohort study was performed in consecutive patients referred for surgical therapy of achalasia. Anthropometric parameters (weight, height and BMI), severity of symptoms (loss of weight, dysphagia, chest pain and regurgitation) assessed with Eckardt score, and nutritional status assessed with MUST (Malnutrition Universal Screening Tool) score were recorded at presentation.

Results

Between 2013 and 2019, 171 patients treated for achalasia were included. There were 88(51.5%) males and 83 (48.5%) females, median age 53 (14-82) years. Median symptoms duration was 36 months (IQR 108). 109 (63.7%) patients had a BMI between 18 and 24.9, 51 (29.8%) had a BMI \geq 25, and 11 (6.4%) had a BMI \leq 18. Compared to total body weight at baseline, there was a 10% (IQR 14) weight loss. The median Eckardt score was 6 (IQR 3). Based on MUST scores, 121 (72.5%) patients were at moderate/high risk of malnutrition. 93 (76.9%) of these patients were overweight or obese. At univariate analysis, patients at moderate/high risk of malnutrition had a higher Eckardt score (7.0 vs 4.5, $p<0.0001$), more severe dysphagia (3.0 vs 2.0, $p<0.0001$), and greater weight loss (10 vs 0, $p<0.0001$) compared to patients with normal MUST score. Negative predictive factors of malnutrition were a higher Eckardt score (OR 1.63, 1.35-1.99, $p<0.0001$), more severe dysphagia (OR 2.68, 1.66-4.30, $p<0.0001$), and greater absolute weight loss (OR 2.37, 1.77-3.17, $p<0.0001$).

Conclusions

More than 75% of patients at moderate/high risk of malnutrition were overweight or obese. These patients may benefit from a perioperative multidisciplinary approach including dietary intervention to stabilize weight and improve nutritional status.

A Single Institution's Experience with Robotic Fundoplication in High-Risk Patients

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Background: This study was undertaken to analyze our outcomes after robotic fundoplication for failed anti-reflux fundoplications, type IV (i.e., giant) hiatal hernias, or after extensive intra-abdominal surgery and to compare those outcomes to outcomes predicted by the American College of Surgeons National Surgical Quality Improvement Program (NSQIP) Surgical Risk Calculator and to national outcomes reported by NSQIP.

Methods: With IRB approval, from 2017 to 2019, 100 patients undergoing robotic fundoplication for failed anti-reflux fundoplications, type IV hiatal hernias, or after extensive intra-abdominal surgery were prospectively followed. Our outcomes were compared with predicted and national outcomes calculated using the NSQIP Risk Calculator and NSQIP. Data are presented as median (mean \pm SD).

Results: 100 patients, aged 67 years (67 \pm 10.3) with BMI of 26 kg/m² (25 \pm 2.9) underwent robotic fundoplication for failed anti-reflux fundoplications (43%), type IV hiatal hernias (31%), or after extensive intra-abdominal surgery with mesh (26%). Operative duration was 184 minutes (196 \pm 74.3) with an estimated blood loss of 24 mL (51 \pm 82.9). Length of stay was 1 day (2 \pm 3.6). 2 patients developed postoperative ileus. 2 patients were readmitted within 30 days for nausea.

Nationally reported outcomes and those predicted by NSQIP were similar (Table). When comparing our actual outcomes to predicted and national NSQIP outcomes, actual outcomes were superior for serious complications, any complications, pneumonia, surgical site infection, deep vein thrombosis, readmission, return to OR and sepsis ($p < 0.05$). Our actual outcomes were not different to predicted and national outcomes for renal failure, deaths, cardiac complications, and discharge to a nursing facility.

Conclusions: Our patients were not a selective group; their predicted outcomes were the same as national outcomes. Most of our results after robotic fundoplication were superior to predicted and/or national outcomes. The utilization of the robotic platform to treat high risk patients with GERD/giant hiatal hernias is safe and efficacious.

Word count: 265/300

Variable	ACS NSQIP Outcomes	ACS NSQIP Predicted	Actual Outcomes
Patients (number)	-	100	100
Serious Complication, %	4	5	0*#
Any Complication, %	4	5	0*#
Pneumonia, %	1	1	0*#
Cardiac Complication, %	0	0	0
Surgical Site Infection, %	1	1	0*#
Urinary Tract Infection, %	1	1	0*#
Venous Thromboembolism, %	0	1	0*#
Renal Failure, %	0	0	0
Sepsis, %	0	1	0*#
Return to OR, %	2	2	0*#
Length of Stay (days)	N/A	2 (2±0.5)	1 (2±3.6)
Death, %	0	0	0
Discharge to Nursing Facility, %	1	2	1
Readmission, %	4	5	2*#

* < ACS NSQIP, p < 0.05

< predicted, p < 0.01

^^ > ACS NSQIP, p > 0.05

Heartburn, But Not Throat Symptoms, Independently Predicts Esophago-Pharyngeal Reflux Events in Patients Presenting with Laryngopharyngeal Reflux Symptoms

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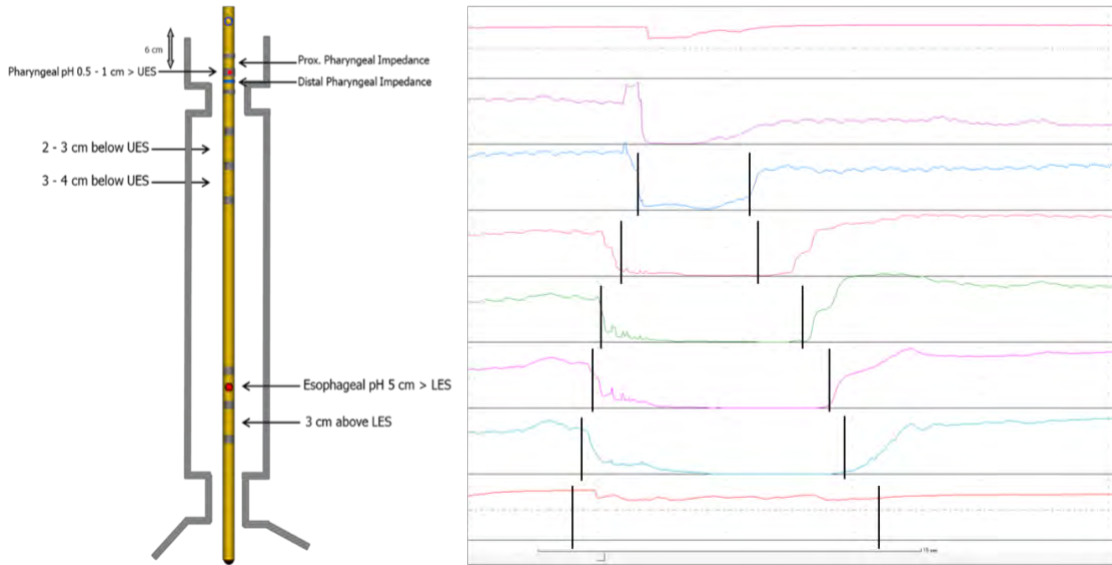
Background: Evaluation of laryngopharyngeal reflux (LPR) symptoms remains challenging, given the variable clinical presentations and treatment response. The combined hypopharyngeal-esophageal multichannel intraluminal impedance and pH testing (HEMII-pH) catheter (Figure 1) allows identification of full column esophago-pharyngeal reflux events. Clinical symptoms associated with objective esophago-pharyngeal reflux have not previously been evaluated. In this study, we aimed to identify independent clinical predictors of esophago-pharyngeal reflux events on objective testing.

Methods: This was a cohort study of adults presenting with LPR symptoms who underwent evaluation with HEMII-pH at a tertiary center in 4/2015-8/2019. All studies were performed off acid suppression therapy. Standardized symptom surveys were prospectively collected at time of HEMII-pH, including Gastroesophageal Reflux Disease Questionnaire (GERDQ), Reflux Symptom Index (RSI), and reflux symptom frequency (1-5) and severity (1-5) scales. Statistical analyses were performed using Pearson correlation for univariate and general linear regression for multivariate analyses.

Results: 208 patients were enrolled (68% female, mean age 58 years). Esophago-pharyngeal reflux events were significantly correlated with total ($R=0.215$, $p=0.014$) and heartburn subscore ($R=0.249$, $p=0.005$) on GERDQ, but not other GERDQ subscores or RSI. On symptom severity and frequency scales, heartburn severity ($R=0.186$, $p=0.048$) and frequency ($R=0.241$, $p=0.011$), regurgitation severity ($R=0.19$, $p=0.035$) and frequency ($R=0.209$, $p=0.029$), and solid dysphagia severity ($R=0.188$, $p=0.050$) correlated with esophago-pharyngeal reflux events, but not any throat symptoms. On multivariate analyses controlling for age, gender, smoking, and asthma history, total GERDQ (β -coefficient 0.308, $p=0.037$), heartburn subscore on GERDQ (β -coefficient 1.345, $p=0.013$), and heartburn frequency (β -coefficient 1.101, $p=0.040$) remained independent predictors for esophago-pharyngeal reflux events, but not RSI, other subscores, or any throat symptom scores.

Conclusion: Heartburn, but not any throat symptoms, independently predicts esophago-pharyngeal reflux events on HEMII-pH in patients presenting with LPR symptoms. Objective testing with HEMII-pH plays a role in management of LPR symptoms, particularly in those without esophageal symptoms.

Figure 1: Combined hypopharyngeal-esophageal multichannel intraluminal impedance and pH testing (HEMII-pH) catheter



A NEW METHOD OF LAPAROSCOPIC STAMM GASTROSTOMY WITHOUT ENDOSCOPIC ASSISTANCE IN ADULTS WITH ASCITES

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OBJECTIVE:

This report describes a new method for laparoscopic gastrostomy tube (LGT) placement in patients with mild-severe ascites, which has been poorly studied. We aim to present a new laparoscopic gastrostomy tube placement method developed in accordance with the classical Stamm-method along with identifying complications.

METHODS:

Anterior stomach wall was identified, and a 2-0 silk purse string suture was placed, where the gastrostomy tube was intended. A needle was passed through from a loop-thread prepared by extracorporeal and were suspended outside. Two concentric circles of 2-0 silk purse-string sutures were placed on anterior stomach wall near greater curvature. The gastrostomy was made in the middle of sutures; tube was inserted, and both threads were knotted outside the abdomen. The two layers of purse string sutures were tied snug around the tube and tacked to abdominal wall with 2-0 silk sutures. Infusion of 18F Moss tube showed no leaks.

RESULTS:

Five patients underwent LGT without any conversions. Three ports (5mmx3) were used. There were no major intraoperative complications. Mean follow-up was 13-months (range 2-24). One patient had tube dislodgement after 25-weeks. No wound infections, cellulitis, or stitch abscesses were noted. None had initial intraperitoneal placement, intraperitoneal dislocation upon replacement, extraluminal migration, tube-related pressure necrosis, or procedure-related death.

CONCLUSIONS:

Our method is a feasible approach for gastrostomy tube placement without any endoscopic assistance by the purse-string suturing and the fixation of the stomach to the abdominal wall without extending the port incision in adult patients with ascites. It allows for the quick, accurate, and safe insertion of the feeding tube under direct visualization and avoids open techniques where PEG tubes are non-feasible. This modified technique eliminates pressure necrosis from external staying-sutures, provides improved adherence of stomach to abdominal wall preventing extraluminal migration and intraperitoneal tube replacement, avoiding additional visits for suture removal.

FEASIBILITY OF LAPAROSCOPIC GRAHAM PATCH REPAIR (LGPR) OF A PERFORATED DUODENAL ULCER IN A MINIMALIST SETTING

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BACKGROUND:

Emergent surgery is indicated for perforated peptic ulcers. The use of laparoscopic management as a first choice for ulcer perforation surgery is gaining ground but is not routine. In this report, we aim to report our experience with laparoscopy as the first approach for the repair of duodenal perforation even during scarcity of resources.

METHODS:

This is an acute presentation of duodenal perforation which was repaired laparoscopically even in a minimalistic setting. This was being done in a veteran hospital setting late night, where we were short of resources at the time. We didn't had usual laparoscopic needle holder or driver at that moment. The surgery was performed with laparoscopic disposable forceps (which can barely hold the needle); using which graham patch repair of duodenal bulb perforation was done. Several staying sutures were placed using 0 nylon and then, omentum was wrapped on perforated site.

RESULTS:

We encountered 2cmx2cm perforation located at duodenal bulb anteriorly, in the post-pyloric region with gross spillage. Post-closure, methylene blue leak test confirmed no leaks. Patient had minimal blood loss during the procedure. Upper GI series on day 8 demonstrated no extravasation. Patient recovered without any complications.

CONCLUSIONS:

Laparoscopy in the treatment of perforated duodenal ulcer is safe and can be utilized as a routine approach. Usually omentum is used for graham patch repair of the perforated ulcer using modified or simple graham patch repair technique. Without its presence, we can also use falciform ligament or small bowel wall for closure of defect. We conclude that during surgical emergencies like perforated peptic ulcer, even in the minimalist settings with few resources, laparoscopic repair can still be done at the hands of an experienced laparoscopic surgeon with the help of a coordinated and skilled teamwork to save life of a patient.

OUTCOMES & MORBIDITY BENEFITS IN PATIENTS UNDERGOING LAPAROSCOPIC SLEEVE GASTRECTOMY: A RETROSPECTIVE ANALYSIS BASED ON ASMBS OUTCOME REPORTING STANDARDS

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BACKGROUND:

Roux-en-Y gastric bypass (RNYGB) is considered gold standard weight-loss surgery by the American Society for Metabolic and Bariatric Surgery (ASMBS). Laparoscopic sleeve gastrectomy (LSG) has grown in recent years with technical simplicity, low complication rate, good weight-loss results and resolution of co-morbidities. Our study aims to present our experience of LSG by analyzing clinical outcomes, complications and differences in follow-up rates based on ASMBS guidelines.

METHODS:

Retrospective analysis of 117 morbidly obese patients who underwent LSG between 2015-2018. The parameters used to evaluate the data included age, sex, weight, body mass index (BMI), percentage of excess weight loss (%EWL), resolution/remission of diabetes, hypertension, dyslipidemias, obstructive sleep apnea (OSA). Aspects related to surgical technique, complications and %EWL in relation to follow-up compliance were also analyzed.

RESULTS:

67 patients were included with 63 (female) + 4 (male), mean age 43.2±13.1 (18-70 years). Mean preoperative BMI was 43.32±4.73 (35.8-54.9) kg/m². Mean postoperative BMI was 32.7±4.50 (25.8-46.6) kg/m². Mean percentage Excess Weight Loss (%EWL) was 60.44±17.82 (28-94)%. Patients with follow-up compliance of 20-59% had mean %EWL of 47.25%; while 60-100% compliance group showed mean %EWL as 63.2% with statistical significance (p<0.025). Remission/improvement rates of diabetes, dyslipidemia, hypertension and OSA were 100%, 100%, 88% and 33% respectively. Mean hospital stay was 2.1 days. There were no major complications: no leaks, readmissions or unplanned returns to OR in same admission. No long-term nutritional or surgical complications were noted.

CONCLUSIONS:

LSG demonstrated satisfactory weight loss results, resolution of various obesity related comorbidities at 3-year follow-up. Amount of weight loss was directly related to adherence to post-operative follow up schedule. Poor compliance can be secondary to poor socioeconomical background, medical conditions, poor caregiver support, transportation difficulties, lower education level or substance abuse. Increasing awareness, health education and addressing socio-economic challenges with multidisciplinary approach can maintain long-term %EWL.

PERSISTENT AND DE NOVO GERD AFTER SLEEVE GASTRECTOMY: MANOMETRIC AND PH STUDY FINDINGS

Luciano Poggi Garland, Diego Romani, Grazia Bernui, Agustin Gavidia, Luis Poggi

BACKGROUND:

Sleeve Gastrectomy (SG) is the most popular bariatric surgery around the world. Several studies show that SG produces Gastro esophageal reflux disease (GERD), However the risk factors and physiologic changes before and after SG have not been elucidated.

METHODS:

Retrospective review of a prospectively collected database consisting of 225 patients who underwent SG between 2006 – 2016 was conducted. Demographic data, pHstudy and manometric studies before and after SG were reviewed.

RESULTS:

The High-Resolution Manometry (HRM) found a significant decrease in Lower Esophageal Sphincter (LES) pressure from 12.26 ± 6.87 mmHg to 8.88 ± 6.29 mmHg, After SG, 53.33% LES were classified as incompetent ($p < 0.01$). Mean gastric pressure before surgery was 8.99 ± 5.73 mmHg, after 100 cc of water ingestion gastric pressure increased to 27.09 ± 38.31 ; however, post SG mean gastric pressures significantly increased to 18.81 ± 11 and 133.84 ± 151.59 respectively. These findings resulted in a pathologic inversion of the esophago-gastric pressure gradient in 45.16% ($p < 0.01$) of the patients who underwent SG. The number of patients with esophageal dysmotility doubled and patients with previous dysmotility did not improved. DeMeester score was abnormal in 35% and 83.3% before and after SG respectively. The Novo GERD was 79%. No significant resolution of GERD after SG occurred, 90.47% of patients who previously had altered DeMeester values continued to be pathologic.

CONCLUSION:

SG produces several physiologic changes including decrease LES pressure, inversion of Esophago-gastric pressure and esophageal dysmotility. These anatomic and physiologic changes explain GERD after SG. DeMeester Score did not improved after surgery and a significant number of patients developed De Novo reflux.

Psychosocial factors and their influence on the quality of life in patients with GERD

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INTRODUCTION

This study evaluates the correlation between patient reported outcomes (PROs), specifically the Gastroesophageal Reflux Disease-Health Related Quality of Life (GERD-HRQL), Laryngopharyngeal Reflux Symptom Index (LPR-RSI) and the recently validated Esophageal Hypervigilance Anxiety Scale (EHAS). We hypothesize that patients with higher EHAS scores have significantly elevated GERD-HRQL LPR-RSI compared to those with normal scores.

PROs are integral to determining the success of foregut surgical interventions. Psychosocial factors have been hypothesized to impact the postoperative quality of life of patients. EHAS has been developed and validated in chronic esophageal disorders but clinical impact is unknown.

METHODS AND PROCEDURES

The GERD-HRQL and LPR-RSI surveys have been administered to patients at our center since 2014. Since June 2019, the EHAS survey has been administered as well. Patients were retrospectively identified. 119 patients (36% men, average age 57 ± 15) completed all 3 surveys and were included in the study. EHAS scores were compared to pre-operative PROs. Subset analysis for patient age and sex was also performed.

RESULTS

A significant correlation was found between EHAS and both PROs (GERD-HRQL; r 0.41, P < 0.001; LPR-RSI; r 0.24, P = 0.009). In the multivariable linear regression model, a higher EHAS score was independently associated with a higher GERD-HRQL score (β 0.27; 95% CI 0.16 to 0.38; P < 0.001; Semipartial R^2 0.17; Adjusted R^2 full model = 0.17) and a higher LPR-RSI score (β 0.12; 95% CI 0.02 to 0.22; P < 0.014; Semipartial R^2 0.05; Adjusted R^2 full model = 0.03).

Table 1. Multivariable linear regression analyses of factors associated with HRQL and LPR-RSI (N=119)

Dependent variables	Retained variables	Regression coefficient [β (95% Confidence interval)]	Standard error	P value	Semipartial R^2	Adjusted R^2
HRQL	Age in years	0.10 (-0.03 to 0.22)	0.06	0.129		
	Men compared to women	-1.67 (-5.41 to 2.07)	1.89	0.379		0.17
	EHAS	0.27 (0.16 to 0.38)	0.06	<0.001	0.17	
LPR-RSI	Age in years	0.01 (-0.10 to 0.11)	0.05	0.905		
	Men compared to women	-0.59 (-3.83 to 2.64)	1.63	0.718		0.03
	EHAS	0.12 (0.02 to 0.22)	0.05	0.014	0.05	

Bold indicates statistically significant difference; Only the semipartial R^2 of significant variables is displayed

CONCLUSION

EHAS is directly and independently associated with higher preoperative PROs, supporting the theorized link between esophageal symptoms and psychosocial factors. This is the first study that compares EHAS to GERD-HRQL and LPR-RSI. EHAS has not previously been used as a preoperative evaluation tool in foregut surgery. Future studies looking at postoperative PRO correlation with preoperative PRO and EHAS may improve selection process for surgical candidates.

Magnetic Sphincter Augmentation: An Advantageous Alternative to Nissen Fundoplication for Preservation of Lung Function

Authors: Arielle M Lee, Josefin Holmgren, Ryan C Broderick, Joslin N Cheverie, Felix Otte, Rachel R Blitzer, Kai Neki, Gordon Yung, Kamyar Afshar, Eugene Golts, Bryan J Sandler, Garth R Jacobsen, David C Kunkel, Santiago Horgan

Introduction:

The association between gastroesophageal reflux disease (GERD) and chronic lung disease is well documented. GERD contributes to bronchiolitis obliterans syndrome (BOS); a major morbidity in the lung transplant population. Early laparoscopic Nissen fundoplication has been shown to improve freedom from BOS, and 1- and 3-year survival post-transplant. Patients who undergo anti-reflux surgery after transplant have stabilization/improvement in pulmonary function testing (PFT). Magnetic sphincter augmentation (MSA) has emerged as an alternative treatment for GERD. We evaluate the safety and efficacy of MSA versus Nissen fundoplication for GERD in chronic lung disease and lung transplant patients.

Materials and Methods:

A retrospective review identified patients followed by the pulmonology department for chronic lung disease or prior lung transplantation that underwent laparoscopic Nissen fundoplication or laparoscopic MSA for reflux. Outcomes included complications, mortality, operative time, length of stay (LOS), and PFTs. Nominal variables were analyzed using Student's t-test, categorical variables by Fisher's exact.

Results:

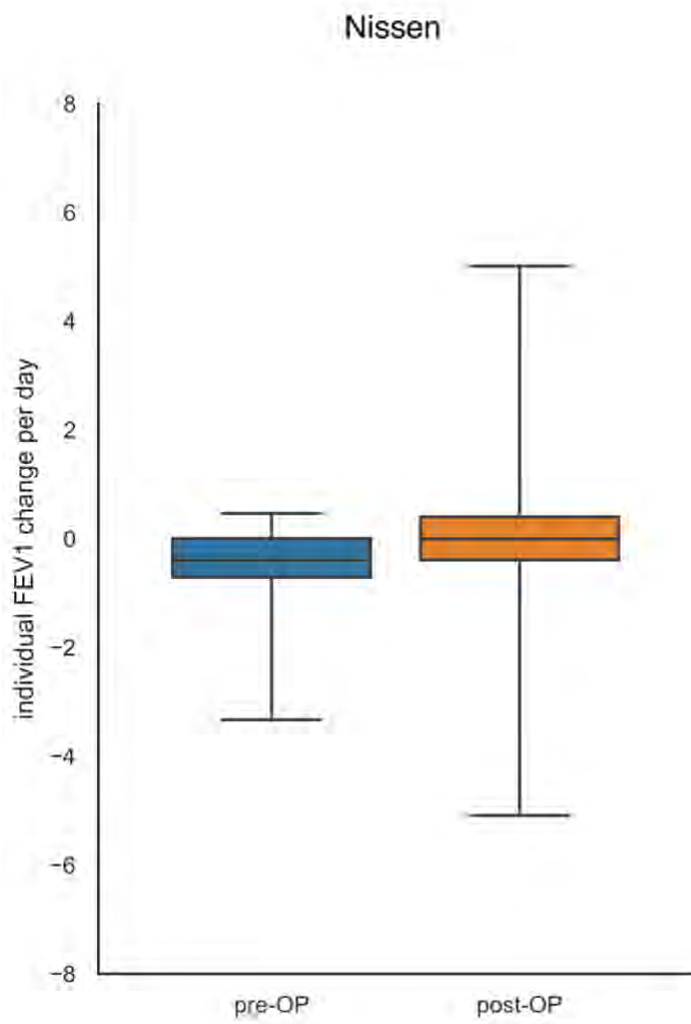
From 2015-2019, 36 patients underwent Nissen fundoplication (n = 20), or MSA (n = 16). Patients were 58.3% female, mean age 55.61 years (range 32-79), average BMI 24.2 kg/m². 52.8% (n = 19) of patients were pre-transplant. 30-day morbidity rates for Nissen and MSA were 5% and 6.2%. Zero 30-day mortalities in either group, LOS was equivalent. Operative time was shorter with MSA versus Nissen, mean 46.68 versus 62 minutes (p-value 0.033). Rate of change of FEV1 (ml/day), while not statistically significant, demonstrated preliminary stabilization post-procedure. In comparing post-op mean FEV1 (p = 0.45) and post-op FEV1 rate of change (p = 0.90) between groups, no statistical significance was seen suggesting non-inferiority of MSA.

Conclusion:

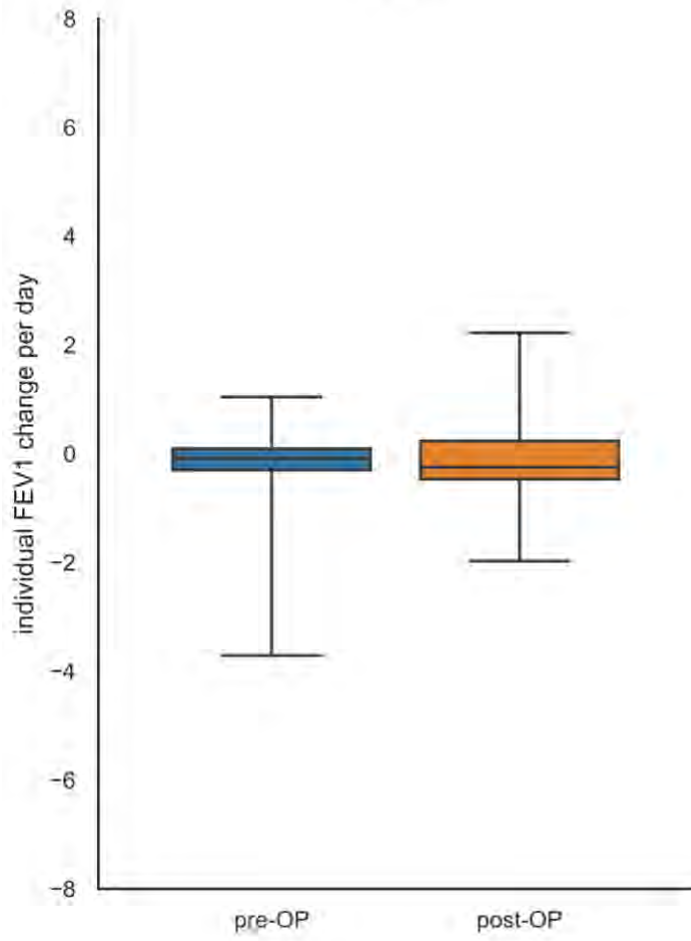
Magnetic sphincter augmentation is an advantageous alternative to fundoplication in the lung transplant and chronic lung disease population with equivalent safety profile and shorter operative time, along with preliminary evidence of stabilization of FEV1.

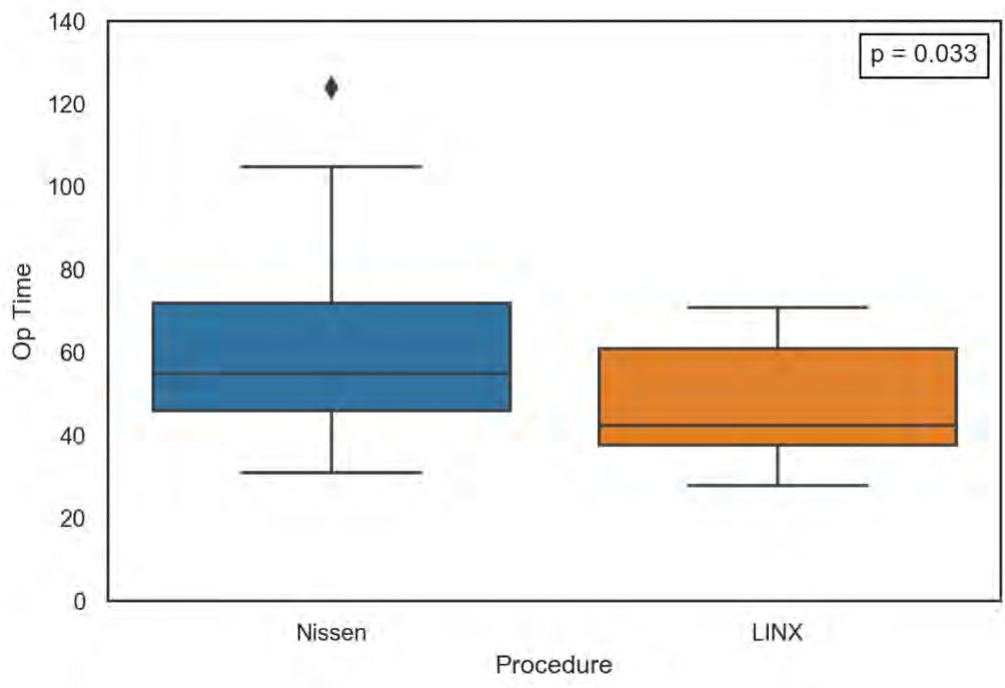
	Pre-op Mean FEV1 (L)	Post-op Mean FEV1 (L)	95% CI	p-value	Pre-op FEV1 rate of change (mL/day)	Post-op FEV1 rate of change (mL/day)	95% CI	p-value
Overall	1.90	1.88	-0.16 to 0.17	0.839	-0.49	0.01	-0.503 to 1.52	0.30
Nissen	1.69	1.76	-0.14 to 0.28	0.489	-0.69	0.16	-1.04 to 2.76	0.34

MSA	2.07	1.98	-0.34 to 0.16	0.438	-0.31	-0.12	-0.98 to 1.36	0.72
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MSA





Pre-operative EUS Decreases Reoperative Rate after Heller myotomy

Arielle M Lee, Rachel R Blitzer, Lauren E McClain, Ryan C Broderick, Joslin N Cheverie, Bryan J Sandler, Garth R Jacobsen, Wilson Kwong, David C Kunkel, Santiago Horgan

Introduction:

Heller myotomy with partial fundoplication has been considered the gold standard for treatment of achalasia; studies cite symptom response rates of 88-97%. Traditionally, myotomy is performed for 6-7cm lengthwise on the esophagus, with a 2-3cm gastric extension. Endoscopic ultrasound (EUS) has been widely utilized in evaluating various pathophysiologic processes within the GI tract. EUS is used for preoperative staging of esophageal malignancies, as it provides highly accurate imaging of the mucosa and submucosa. We sought to explore the utility of muscle thickness mapping using pre-operative EUS measurements with respect to altered surgical planning and associated surgical outcomes in achalasia patients.

Materials and Methods:

A retrospective review of a prospectively maintained database was performed identifying patients that underwent laparoscopic or robotic-assisted Heller myotomy for achalasia at a single institution. Outcomes included complication rate, length of stay (LOS), 30-day morbidity and mortality, dysphagia resolution, overall symptom resolution, and major versus minor reintervention in the non-EUS vs EUS modified technique groups. Post-operative outcomes were compared between groups using chi-squared.

Results:

From 2013-2019, 72 identified patients underwent laparoscopic or robotic-assisted Heller myotomy with partial fundoplication. 37 were female (51.4%), with mean age 56.27 years (range 21-88), and mean BMI 27 (range 17.92-53.99) kg/m². Median Charlson comorbidity index was 2 (range 0-9). 47 patients underwent standard Heller myotomy without pre-operative EUS mapping, while 25 patients underwent Heller myotomy with pre-operative EUS mapping. 36% (9/25) of the EUS patients had surgical technique alteration to include the full length of thickened muscle layer, based on either location or length of thickened esophageal muscle layer. Within this group, 2 patients underwent thoracoabdominal myotomy based on EUS, rather than the standard abdominal approach. In comparing post-operative outcomes between the non-EUS versus EUS modified approach patients, no difference was seen in LOS, dysphagia resolution, overall symptom resolution, 30-day morbidity, ED visits, or readmissions. Reinterventions were divided into major vs minor; minor defined as balloon dilation or Botox. Major interventions included thoracic myotomy, redo myotomy, POEM, needle-knife myotomy. While not statistically significant, a trend toward higher rate of both overall (19.1% vs 11.1%) and major reintervention (6.4% vs 0%) was seen in the non-EUS group when compared to the EUS-modified achalasia patients.

Conclusion:

Use of routine EUS in surgical planning for achalasia patients reduces complication rate and need for reinterventions.

	Non-EUS (n = 47)	Mod EUS (n = 9)	p-value
Dysphagia resolution	39 (84.7%)	8 (88.8%)	0.65
Overall symptom resolution	38 (80.9%)	8 (88.8%)	0.91
30-day morbidity	3 (6.4%)	1 (11.1%)	0.61
ED visits	4 (8.5%)	0	0.84
Readmissions	1 (2.1%)	1 (11.1%)	0.72
Overall reintervention	9 (19.1%)	1 (11.1%)	0.91
Major reintervention	3 (6.4%)	0	0.43
Minor reintervention	6 (12.7%)	1 (11.1%)	0.89

<i>Achalasia Type</i>	<i>Non-EUS (n = 47)</i>	<i>Modified EUS (n = 9)</i>
<i>Type 1</i>	11 (23.4%)	2 (22.2%)
<i>Type 2</i>	18 (38.3%)	3 (33.3%)
<i>Type 3</i>	2 (4.3%)	3 (33.3%)
<i>Achalasia NOS</i>	16 (34%)	0
<i>Nutcracker esophagus</i>	0	1 (11.1%)

Refractory benign esophageal stricture caused by fibrosing mediastinitis secondary to histoplasmosis successfully treated with esophageal self-dilation

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Background: Refractory benign esophageal strictures (RBES) are defined as strictures which fail to maintain luminal patency after five endoscopic dilations. RBES are extremely difficult to treat and current therapies are risky and have disappointing results. Self-dilation therapy has been proposed as a treatment alternative in RBES secondary to radiation or anastomotic strictures, but no experience with strictures due to extrinsic compression have been reported.

Methods: Retrospective chart review

Results: A 51-year-old female patient presented in March 2016 with dysphagia to solids, dyspnea, and a 25-pound unintentional weight loss. An esophagogastroduodenoscopy revealed a 2 cm mid-esophageal stricture with a 5 mm internal diameter. Bronchoscopy revealed a paraesophageal mass that was positive for histoplasmosis on GMS staining. She received prolonged antifungal therapy including amphotericin B and itraconazole. Whilst her infection resolved, she was left with sequelae of recurrent esophageal stenosis and airway compromise as a consequence of fibrosing mediastinitis. Her esophageal stricture failed to respond to 12 endoscopic dilations over a 24-month period. By October 2017, an esophagram (Figure 1) revealed mild esophageal dilation proximal to a tight mid-esophageal stricture, and daily self-dilation therapy was initiated with a 13 mm tungsten-filled polyvinyl dilator in December 2017. In the subsequent 24 months, she only required two endoscopic dilations, and after adjustment of dilator insertion depth and technique, none in the past 10 months. No complications were observed and the patient now eats an unlimited diet. The current esophagram (Figure 2) reveals dramatic interval improvement of her previously dilated esophagus and only minimal narrowing at the site of previous stricture formation, which allowed passage of a 13 mm radiolucent tablet. The self-dilator passed also through the stricture without difficulty during video-fluoroscopy (Figure 3)

Conclusions: This is the first described case of RBES caused by extrinsic compression successfully treated with self-dilation therapy.

Word count: 295

Figure 1: Esophagram with severe mid esophageal stricture Dec 2017

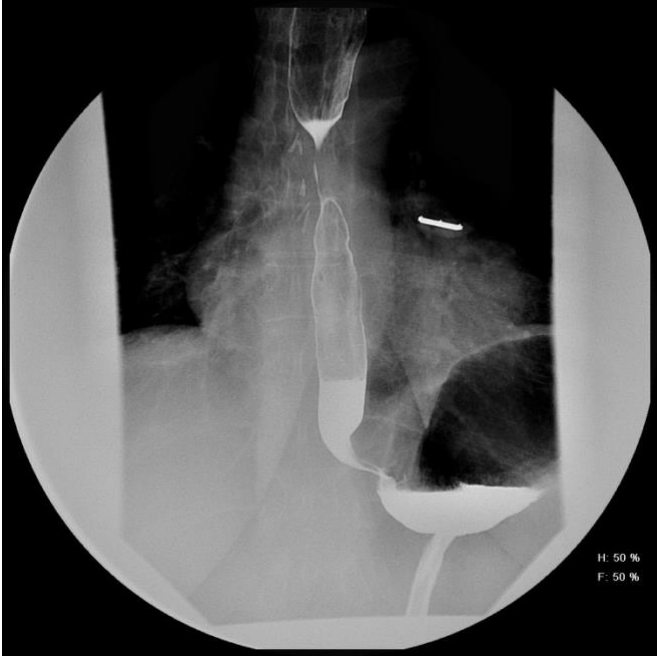


Figure 2: Esophagram with improvement of mid esophageal stricture Dec 2019

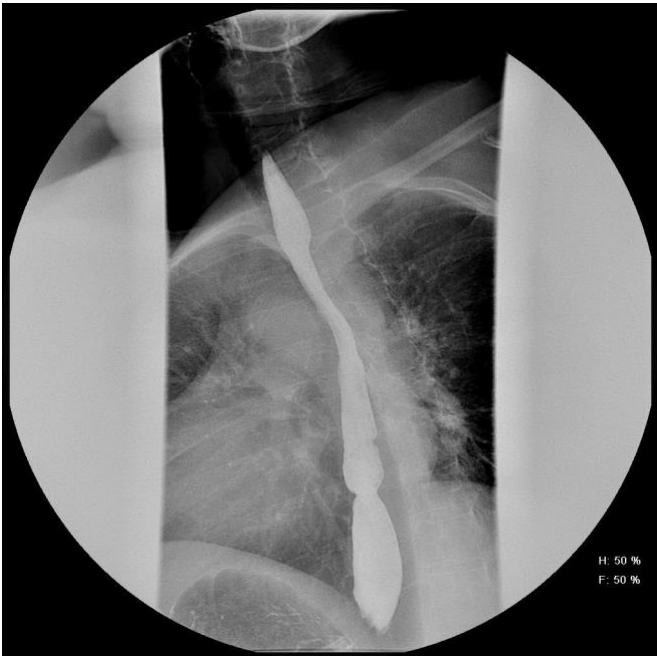
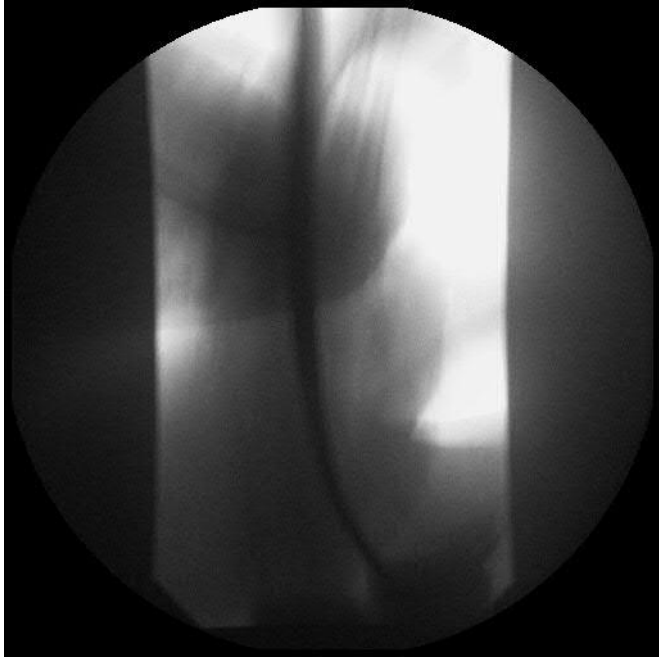


Figure 3: Single frame from video showing self dilation insertion



Pre-Screening for Bariatric Surgery Patients: Comparative Effectiveness of Transnasal Endoscopy versus Esophagogastroduodenoscopy

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Gundersen Health System; La Crosse, WI

BACKGROUND: Endoscopic evaluation is frequently performed preoperatively in bariatric surgery patients to identify foregut pathology that may alter surgical procedure selection. Transnasal endoscopy (TNE) is an alternate approach to conventional screening with esophagogastroduodenoscopy (EGD). The objective of this study was to compare TNE to EGD.

METHODS: A retrospective review of patients who underwent TNE or EGD as part of the preoperative work-up for laparoscopic Roux-en-Y gastric bypass (LRYGB) or sleeve gastrectomy (LSG) from January 2012 through April 2019 was performed. TNE was offered beginning in 2017. Statistical analyses included chi-square, Wilcoxon two-sample, and Fisher's exact tests. A p -value <0.05 was considered significant.

RESULTS: 345 patients underwent bariatric surgery [63 (18%) LSG, 282 (82%) LRYGB] and preoperative screening [216 (63%) EGD, 129 (37%) TNE]. A higher proportion of patients in the EGD vs. TNE group underwent LSG (87% vs. 73%; $p=0.001$). Mean age and preoperative body mass index in the TNE and EGD groups were 46.2 ± 12.4 vs 45.5 ± 11.6 years ($p=0.58$) and 46.5 ± 7.1 vs. 45.5 ± 6.1 kg/m² ($p=0.25$), respectively. Three TNEs were aborted, resulting in a success rate of 98%. Of patients who underwent EGD, 1 (0.5%) visited the emergency department (ED), and 7 (3%) called the nurse with post-procedure concerns. There were no ED visits or nurse calls from patients who underwent TNE. The median total time in the procedure room was 77 (57-97) minutes for the EGD group vs. 26 (8-33) minutes in the TNE group ($p<0.001$). One patient who underwent TNE required subsequent EGD. Mean charge per patient for EGD and TNE was \$5,034.70 and \$1,464.00, respectively.

CONCLUSIONS: TNE was associated with less post-procedure care, shorter procedure time and substantially fewer charges compared to EGD. TNE could be considered an initial screening tool for patients undergoing bariatric surgery, while EGD could be used selectively in patients with abnormal TNE findings.

Prevalence of Esophageal A and B-rings in Patients Presenting with Solid Food Dysphagia

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Department of Otolaryngology-Head and Neck Surgery, University of California-Davis, Sacramento, CA, U.S.A.

Background

Esophageal A (EAR) and B-rings (EBR) have been identified as a primary cause of solid food dysphagia, but the prevalence of these rings as a cause of solid food dysphagia is uncertain. The purpose of this investigation is to evaluate the prevalence of constricting EAR and EBR as a primary cause of solid food dysphagia.

Methods

The charts of all persons with solid food dysphagia undergoing a video fluoroscopic esophagram (VFE) between 1/1/16 and 5/30/18 were identified from an electronic dysphagia database. Patient demographics, Eating Assessment Tool (EAT10) and the prevalence of EARs, EBRs and hiatal hernia (HH) were recorded.

Results

The VFE of 900 patients with solid food dysphagia were reviewed. Mean age (\pm SD) of the cohort was 63 (\pm 15) years and 53% was female. The mean (\pm SD) EAT-10 of the entire cohort was 18 (\pm 19). EAR was identified in 4.7% (42/900), EBR in 11% (100/900) and HH in 34% of studies (306/900). Of the entire cohort, only 1.9% (17/900) had their dysphagia symptoms attributed to a constricting EAR or EBR (0.1 and 1.8% respectively).

Conclusion

Symptomatic A and B-rings as a primary source of dysphagia, however, are rare (<2%), and alternative causes of swallowing dysfunction should be sought.

Regulation of intestinal breast cancer resistance protein (BCRP) in obesity

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2. Coastal Bend Pathology, Kingsville, Texas 78363

Breast cancer resistance protein (BCRP) is a member of ATP-binding cassette (ABC) transporter proteins whose primary function is to efflux substrates bound to the plasma membrane. Impaired intestinal barrier functions play a major role in chronic low-grade inflammation (CLGI)-associated obesity, but the regulation of BCRP during obesity and its role in maintaining the intestinal barrier function during CLGI-associated obesity are unknown. In the present study, using several approaches, including efflux assays, immunoprecipitation, immunoblotting, immunohistochemistry, paracellular permeability assay, FACS, cytokine assay, and immunofluorescence microscopy, we report that obese individuals have compromised intestinal BCRP functions and that diet-induced obese mice recapitulate these outcomes. We demonstrate that the compromised BCRP functions during obesity are because of loss of Janus kinase 3 (JAK3)-mediated tyrosine phosphorylation of BCRP. Our results indicate that JAK3-mediated phosphorylation of BCRP promotes its interactions with membrane-localized β -catenin essential not only for BCRP expression and surface localization, but also for the maintenance of BCRP-mediated intestinal drug efflux and barrier functions. We observed that reduced intestinal JAK3 expression during human obesity or JAK3 knockout in mouse or siRNA-mediated β -catenin knockdown in human intestinal epithelial cells all result in significant loss of intestinal BCRP expression and compromised colonic drug efflux and barrier functions. Our results uncover a mechanism of BCRP-mediated intestinal drug efflux and barrier functions and establish a role for BCRP in preventing CLGI-associated obesity both in humans and in mice.

PARAESOPHAGEAL HERNIA REPAIR OUTCOMES IN THE ELDERLY Michael J Nisiewicz, Kathryn Kraft, Margaret A Plymale, Amber Bettis, Daniel L Davenport, J. Scott Roth

INTRODUCTION

Paraesophageal hernias affect patients of all ages, with increasing incidence as age progresses. However, increasing age has been demonstrated to be an independent risk factor for postoperative morbidity and mortality. This study evaluates outcomes following laparoscopic paraesophageal hernia repair (LPEHR) for large types 3 and 4 paraesophageal hernias for patients 80 years old or greater compared to patients younger than 80.

METHODS

An IRB-approved review of a prospective database of LPEHR was performed at a single institution. Patient demographics, comorbid conditions, operative details, and postoperative outcomes were reviewed. Patients \geq 80 years of age were compared to those younger than 80 years of age.

RESULTS

292 patients were identified that underwent LPEHR during the study period. Overall, 28 (10%) patients were \geq 80 years. There was no difference in diabetes, COPD, asthma, cancer history, coronary disease or tobacco abuse between groups. Hypertension was more common in the elderly (89% vs 58%, $p=.0009$). Elderly patients were more likely to have a completely intrathoracic stomach (75% vs. 42%, $p=.0012$), ASA Class III/IV (93% vs 61%, $p=.0006$), and undergo placement of a PEG (54% vs 27%, $p=.0078$) compared to those less than 80 years. Operative duration was shorter in the elderly group (151 vs 163 min, $p<.01$). Median length of stay was longer in the elderly (4 vs 2 days, $p<.001$). There were no differences in incidence of postoperative complications, readmissions or hernia recurrence measured by UGI, or reoperation between those older than 80 vs those younger.

CONCLUSIONS

Paraesophageal hernia repair in the elderly may be safely performed with similar morbidity to younger patients despite an increased hospital length of stay. Long-term hernia recurrence rates do not differ between elderly patients and those less than 80 years of age. Advanced age should not be a contraindication to paraesophageal hernia repair.

HARD TO SWALLOW RESULTS: ASSESSMENT OF PROCEDURAL PERFORMANCE AND COMPLIANCE WITH STANDARDIZED INTERPRETATION OF HIGH RESOLUTION ESOPHAGEAL MANOMETRY STUDIES POST-QUALITY IMPROVEMENT INITIATIVE AT A LARGE COMMUNITY HOSPITAL

AUTHORS

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Disclosures: None for all authors except Moshiree (Medtronic)

BACKGROUND

The American Neurogastroenterology and Motility Society (ANMS) has proposed quality measures (QMs) for performance and interpretation of esophageal manometry (EM) (Yadlapati 2016), yet many practices have not adhered to guidelines. In Phase I of our QI project, we analyzed the compliance to ANMS QMs in terms of procedural performance (Seminara 2019). In Phase II, we expand upon our now correctly performed studies and investigate whether these studies now meet QMs for data interpretation with respect to the Chicago Classification Guidelines (Kahrilas 2015) and whether they result in the appropriate treatment.

METHODS

Gastroenterologists (n=7) without formal motility training were provided data with recent publications utilizing the Chicago Classification for interpretation of EM. Seventy-seven EM studies from January to September 2019 were reviewed since the training. All studies were reread by 2 independent readers: a motility expert (BM) and an advanced care practitioner with motility fellowship training (MAJ). Data was assessed for: procedural compliance, correct diagnosis, missing items based on the Chicago Classification, treatment and referral plan, and the appropriateness of surgical referral.

RESULTS

We found high procedural compliance (97%, n=75). An incorrect diagnosis was made in 58% (N=45) of studies with 88% (n=68) having at least one missing item based on the Chicago Classification. Majority of missing items included the distal contractile integral (36%, n=28), the upper esophageal sphincter relaxation or pressure (44%, n=34), and lack of communication with the referring provider (12%, n=9). In 31% (n=24) of studies, a treatment plan was missing. Among the 35% (n=27) of surgery referrals, 37% (n=10) were incorrectly referred.

CONCLUSION

Our study shows poor data interpretation overall by community gastroenterologists without formal motility training in reading of EM studies despite adequate performance by technical staff. Follow-up will be undertaken to assess the impact of a hands-on teaching workshop with subsequent interpretation of EM studies.

Management of Jackhammer Esophagus: A Diverse and Challenging Paradigm

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Introduction:

Jackhammer esophagus (JE) is a hypercontractile disorder of the esophagus traditionally treated with medical or endoscopic therapy. JE can be associated with gastroesophageal reflux disease (GERD). The authors present a single center review of JE patients undergoing medical and surgical therapy.

Methods:

A retrospective review of JE patients referred to a single motility lab or surgery clinic (2016-2019) was performed. Review of patient workup/treatment in gastroenterology and surgery clinics, including operative records, was performed.

Results:

A total of 24 patients, mean age: 57 ± 11.3 years, predominately female (83.3%), with mean BMI 29.4 ± 4.3 kg/m² were manometrically identified to have JE. Mean symptoms duration was 3.1 ± 3.9 years. The most common symptoms were dysphagia in 18 patients (75%) and heartburn (75%), followed by regurgitation in 14 (58.3%), and chest pain in 13 (54.2%). Thirteen patients had pH testing, with 61.5% being abnormal. All patients had HRM, with mean IRP of 8.9 ± 3.6 mmHg and normal LES pressure, mean DCI of 9358.6 ± 4807.8 mmHg-s-cm, and mean highest DCI $18,313.1 \pm 10415.7$ mmHg-s-cm. Eight with failed medical management underwent surgery. These patients had abnormal DeMeester scores (27.9 ± 21.5 vs 8.8 ± 10.1 , $p=0.09$) and total reflux episodes (82.8 ± 35.4 vs 43.9 ± 49.8 , $p=0.037$). Seven patients underwent laparoscopic operations: 4 Toupet funduplications, 1 epiphrenic diverticulectomy with Heller myotomy and toupet fundoplication, 1 Nissen fundoplication, and 1 conversion of sleeve gastrectomy to Roux-en-Y gastric bypass. One patient with prior gastric bypass underwent long peroral endoscopic myotomy. There were no complications or 30-day readmissions. The remaining 16 patients underwent medical/endoscopic therapy: 15 (93.8%) PPIs, 5 (31.3%) CCBs, 4 (25%) peppermint, 3 (18.8%) trazodone, 1 antidepressant, 2 endoscopic dilations, and 1 Botox injection. Six did not follow-up. Post-intervention symptoms resolved in 62.5% of surgical patients and 60.0% of medical patients ($p=0.91$). Dysphagia was the most common residual symptom (33.3%).

Conclusion:

Medical and surgical therapy for JE are both safe and effective. Surgical therapy is beneficial in most patients who fail medical management and have abnormal pH testing.

299/300 Words

Discontinuous Magnetic Sphincter Augmentation Device: Revision and Re-sizing

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Gastroesophageal reflux disease (GERD) is a prevalent foregut pathology, and surgical intervention has been proven to be efficacious. Magnetic sphincter augmentation of the lower esophageal is an innovative surgical method first performed in 2008. The LINX® system has been proven to be safe and has become a popular alternative to fundoplication due to its effectiveness and ease of placement using a minimally invasive approach. Although rare, complications can occur, most commonly dysphagia and very infrequently erosion or disruption. We present a case and an accompanying video of a discontinuous LINX® that was removed and replaced using robotic assistance.

In July 2017, a hiatal hernia repair was performed and a size 14 LINX® device was placed in a 58-year-old patient for treatment of gastroesophageal reflux disease confirmed with Bravo ambulatory pH testing. Two years later, the patient developed sudden onset recurrent heartburn. Bravo ambulatory pH testing was performed and confirmed recurrent GERD. A radiograph demonstrated discontinuous LINX®.

Robot assisted capsulotomy and LINX® removal was performed and confirmed a posterior disruption of the LINX® due to bead separation where the wire entered the bead capsule. The device was not part of the lot recalled by the manufacturer due to concerns regarding disruption. The patient was satisfied with the results of magnetic sphincter augmentation prior to disruption and elected to have a new LINX® device implanted. Our institution has been utilizing EndoFLIP extensively intraoperatively in foregut surgery including hiatal closure, fundoplication, and more recently LINX sizing. This protocol for LINX® sizing was utilized to measure the esophagus for a new device over an EndoFLIP balloon catheter filled to 30 cc in the esophagus. A size 17 LINX® device was selected using this technique and was implanted after crural closure. The patient's heartburn has completely resolved, and she has not experienced dysphagia.

Automated Learning of Laparoscopic Hiatal Hernia Repair Videos to Identify Surgical Instruments

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Background

Digital recordings of laparoscopic procedures are a useful source for retrieving information regarding the operation, as well as assessing operative skills. The process of indexing and segmenting large volumes of videos, however, is time consuming and requires considerable resources. A completely automated system to analyze videos of laparoscopic procedures will be a valuable tool. In this work, we present a system that can automatically detect the surgical instruments in every frame of laparoscopic hiatal hernia repair videos.

Methods

Laparoscopic hiatal hernia repair videos recorded by the senior author were assessed using a Convolutional Neural Network (CNN). CNN is a deep learning technique suitable for various computer vision tasks, such as image classification, object detection, and video processing. Given an annotated dataset, a deep CNN was trained to extract discriminating visual features for classifying each frame of a laparoscopic video based on the presence of different surgical instruments. A trained model was then applied to unseen videos to identify the instruments.

Results

Ten videos of laparoscopic hiatal hernia repair operations were collected. Each video was labeled with four instruments: Harmonic scalpel, Knot pusher, Needle driver, and Shears. Seven videos were used for training and three videos for validating the performance of the model. The CNN architecture was based on Resnet50. The current accuracy is 80.02%. The inference time is less than 0.01 second, which makes the model suitable for real-time applications.

Conclusions

We developed a deep learning model to automatically identify the presence of surgical instruments in laparoscopic hiatal hernia videos. The extracted pattern for the instruments' usage can be used in designing an automated surgical video analysis and skill assessment system for intra-operative and post-operative education. In the future, we plan to collect more videos of hiatal hernia repair to improve accuracy, and to expand the model to include additional surgical instruments.