MAYO CLINIC

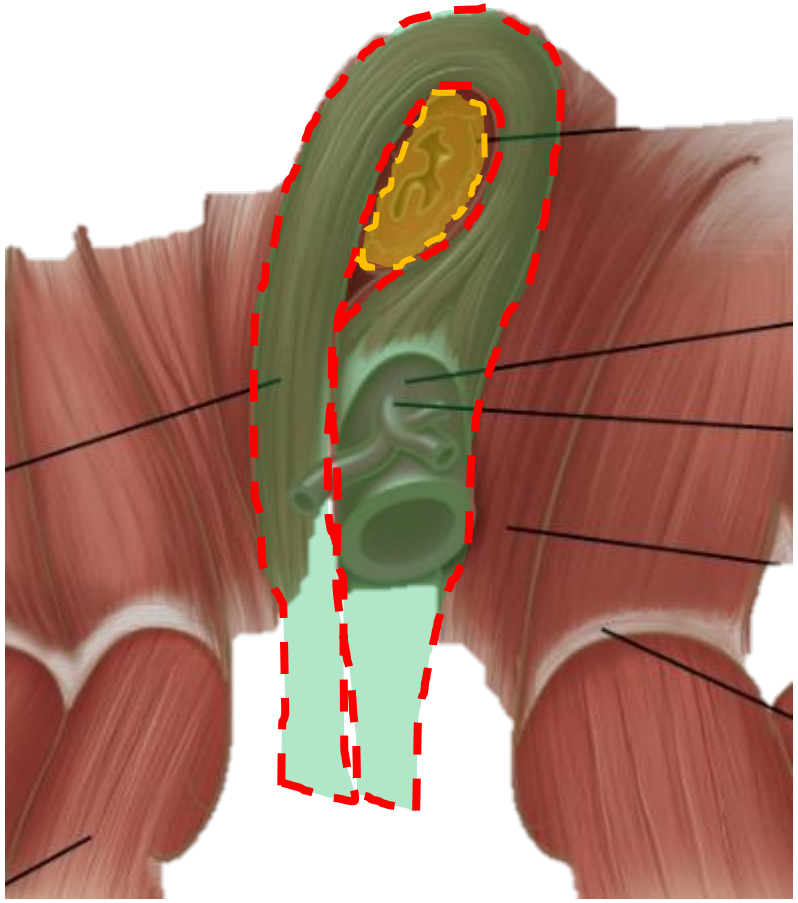
Reflux after Bariatric Surgery

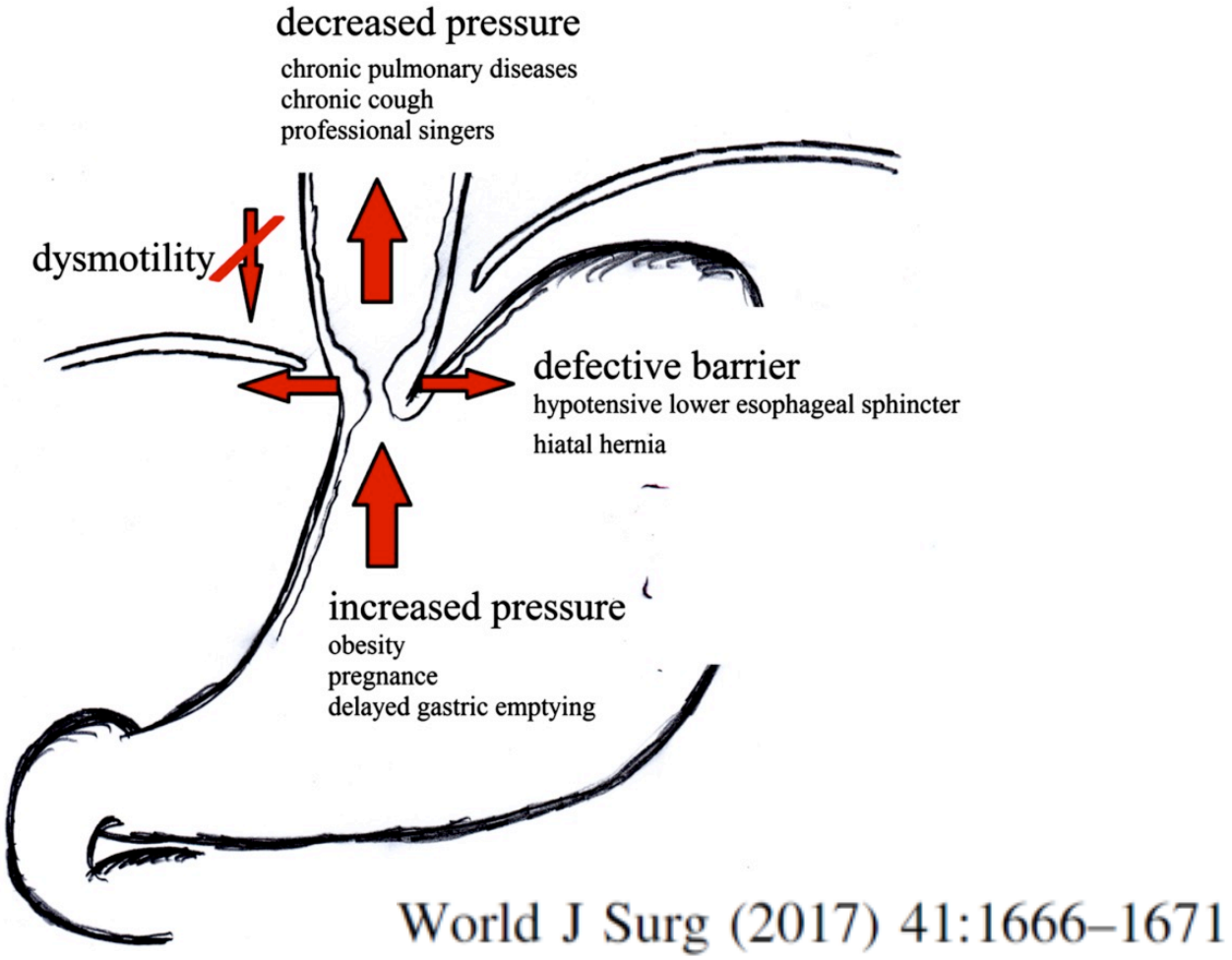
Barham Abu Dayyeh, MD MPH FASGE
Consultant in Gastroenterology, Hepatology, and Therapeutic Endoscopy
Director of Advanced Endoscopy
Vice Chair of Innovation
Professor of Medicine
Mayo Clinic, Rochester MN

Disclosures

- Consultant: Boston Scientific, Metamodix, BFKW, USGI, Endogastric Solutions, Endogenex
- Research Support: Apollo Endosurgery, USGI, Endogastric Solutions, Boston Scientific, Aspire Bariatrics, GI Dynamics, Medgus, Medtronic, Spatz, Cairn.
- Speaker: Johnson & Johnson, Olympus

Anatomy and Physiology

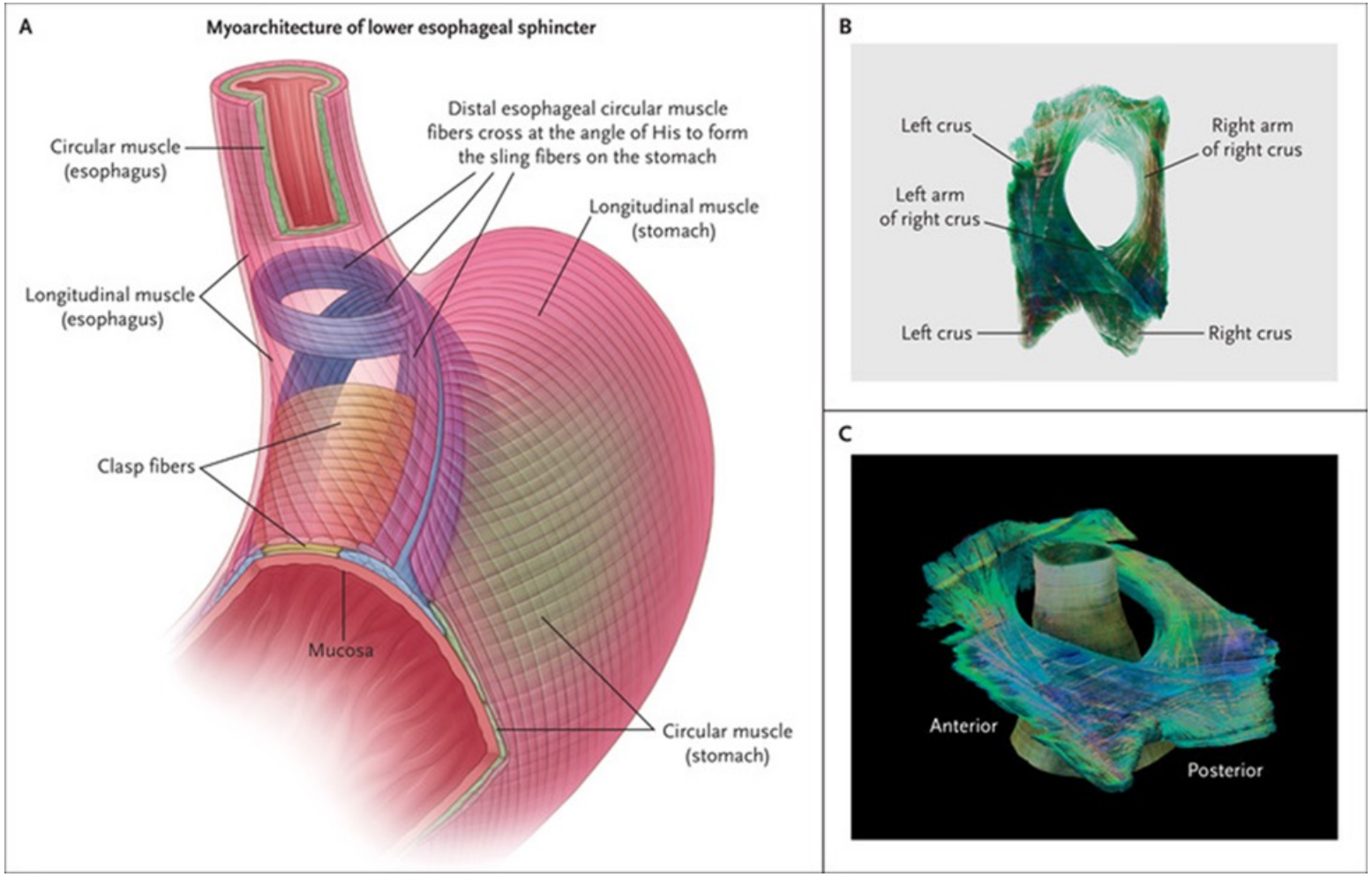




World J Surg (2017) 41:1666–1671

Anatomy and Physiology: Mechanism of Reflux

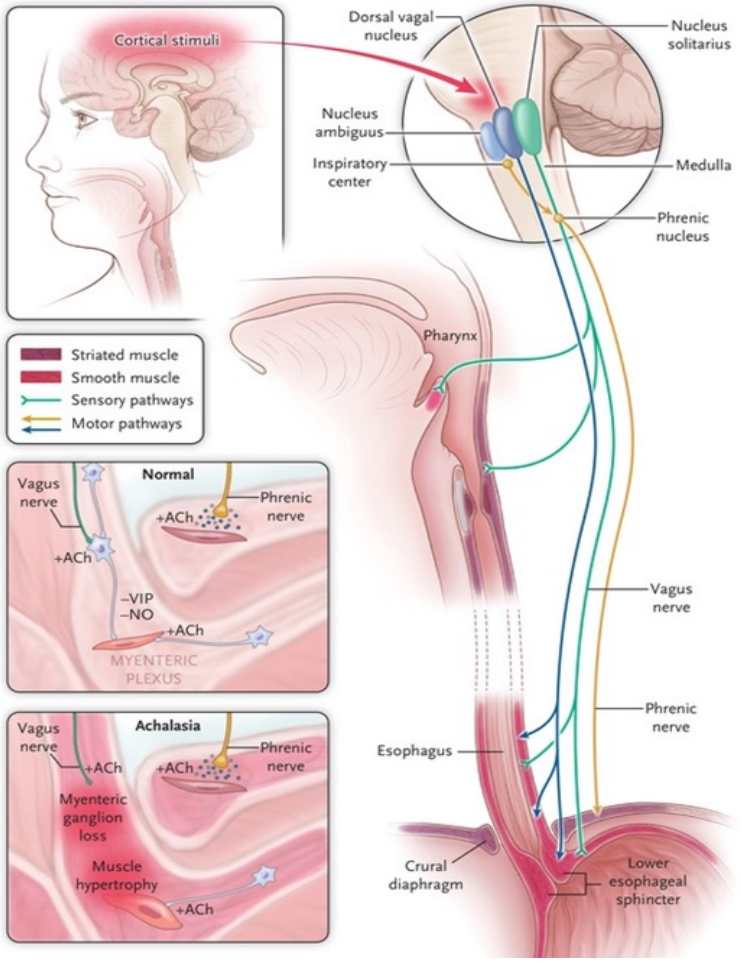
Anatomic



N Engl J Med 2020; 383:1961-1972

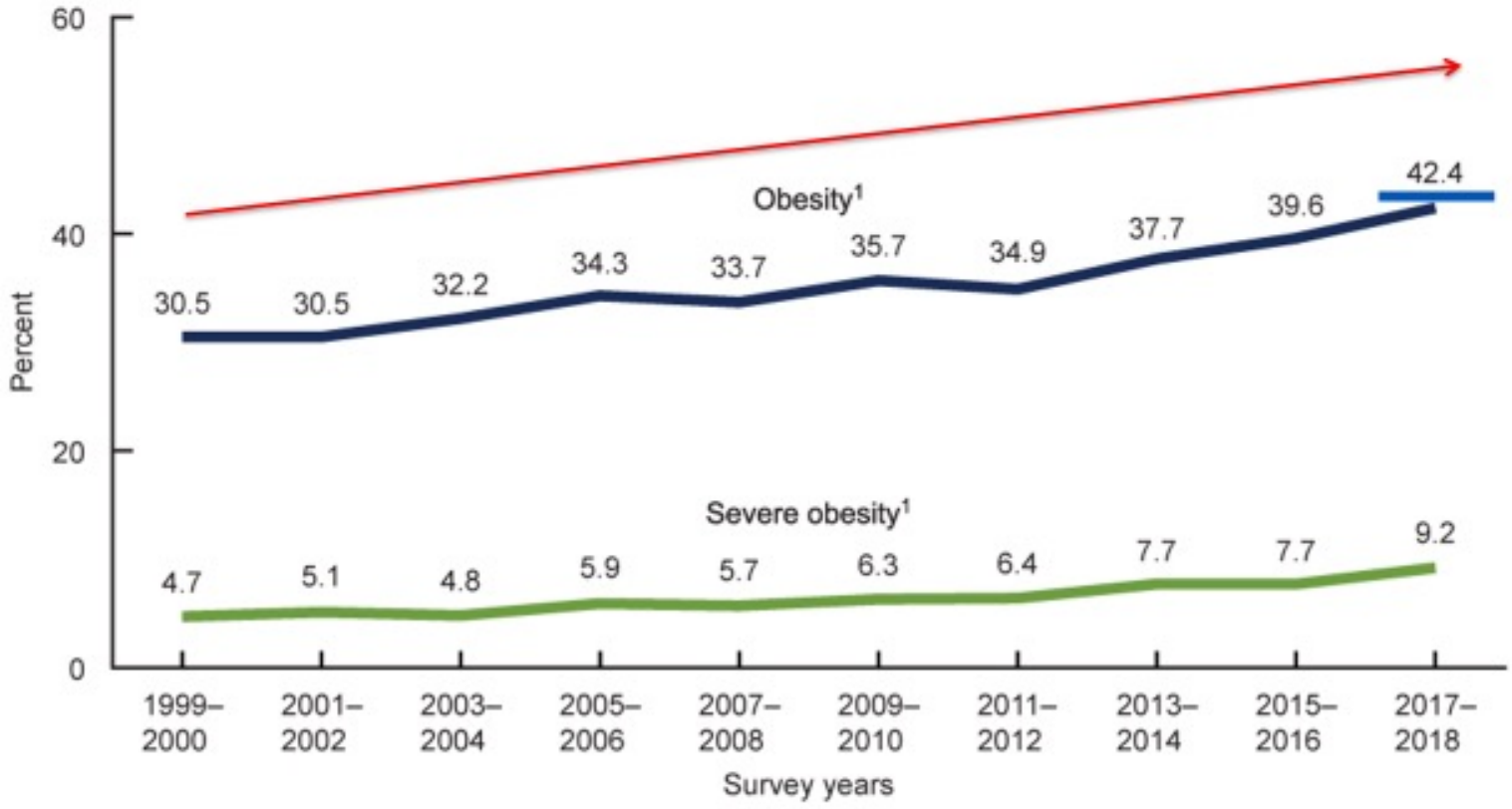
Anatomy and Physiology: Mechanism of Reflux

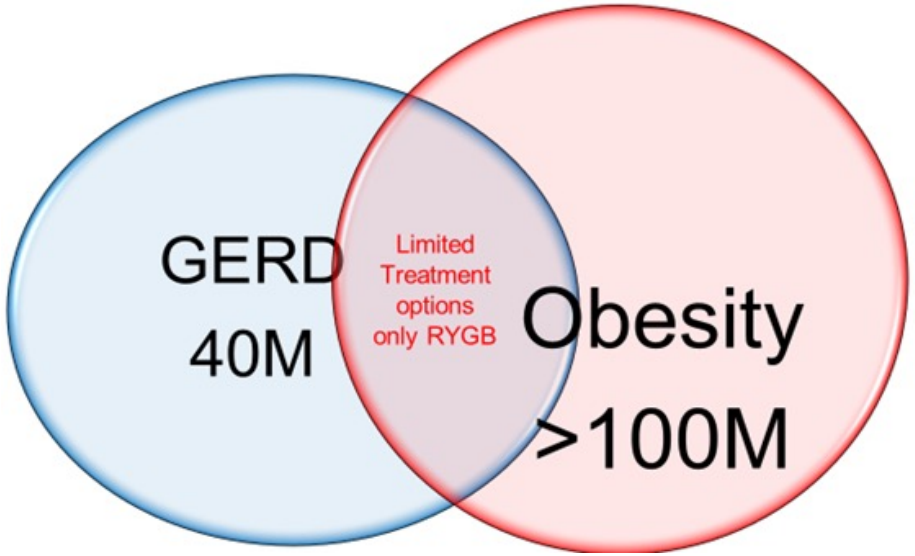
Neuronal



N Engl J Med 2020; 383:1961-1972

GERD and Obesity





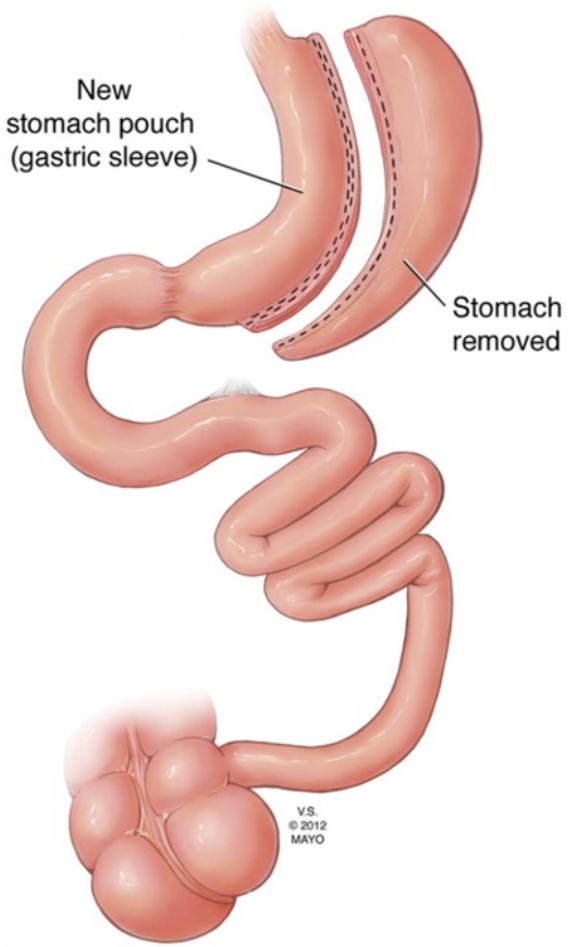
Hales CM, National Center for Health Statistics 2020

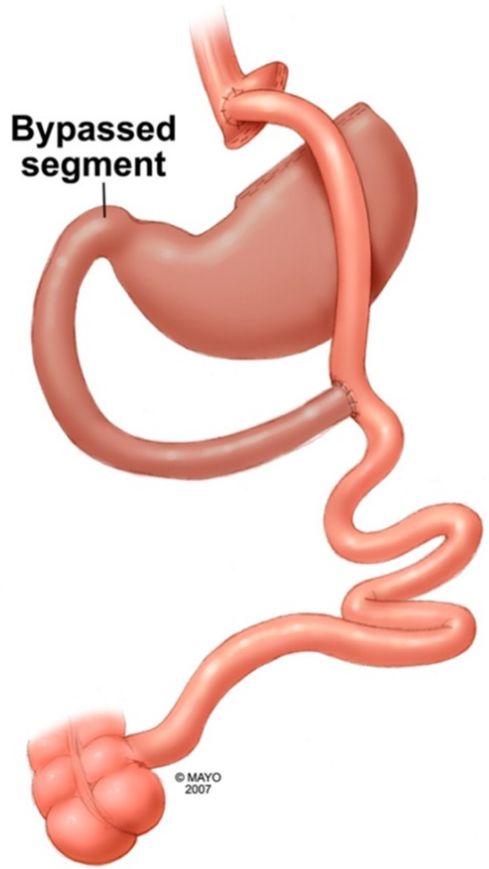
GERD in Patients with Obesity

- Each five-points increase in BMI the DeMeester score increases by 3 units
- Increased esophageal acid exposure
- Reflux symptoms link positively with BMI
- Correlation between BMI and erosive esophagitis
- Increasing BMI is significantly associated with the incidence of adenocarcinoma of the esophagus and gastric cardia

Surgical Endoscopy (2020) 34:450–457

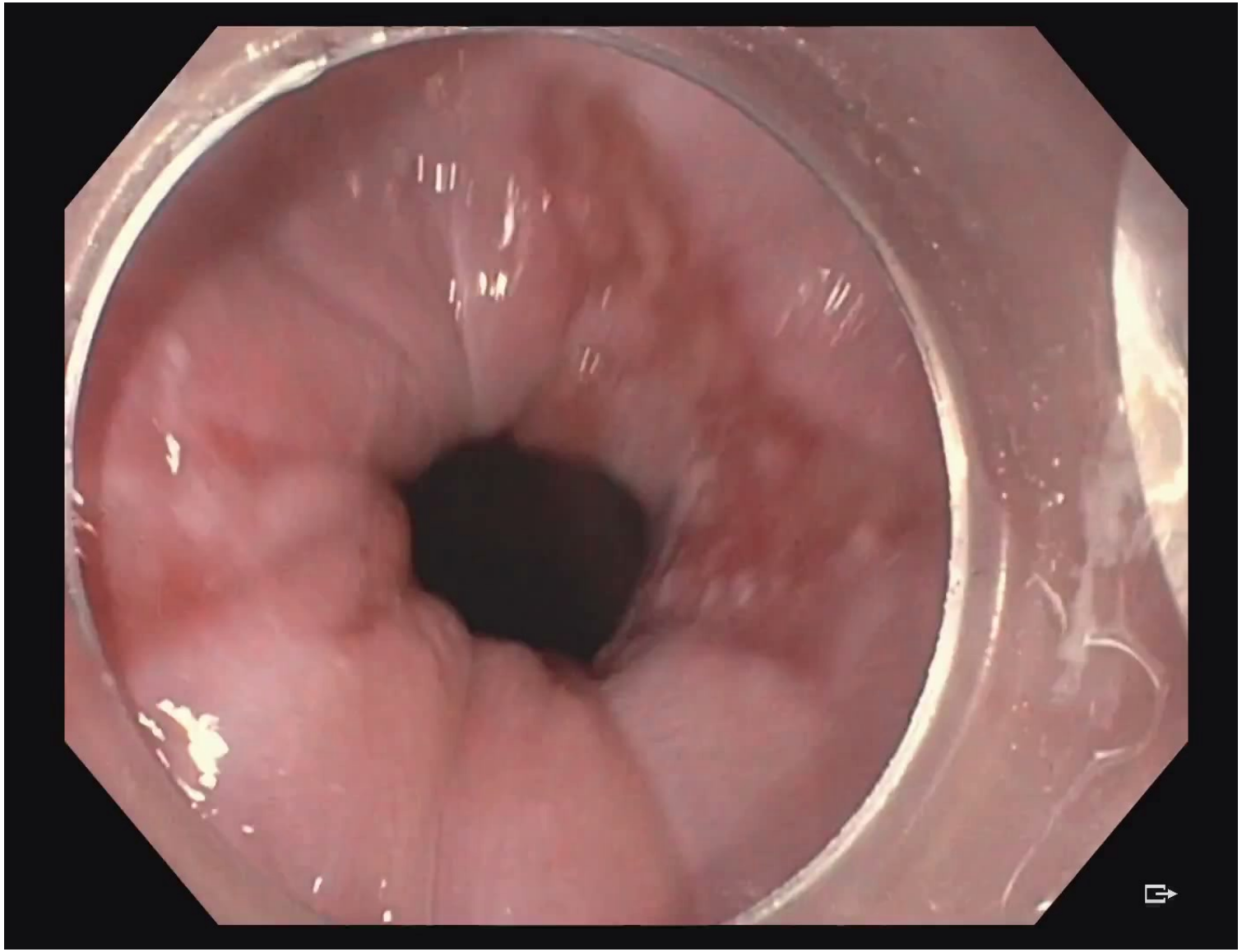
Bariatric Surgery: Physiology of Reflux



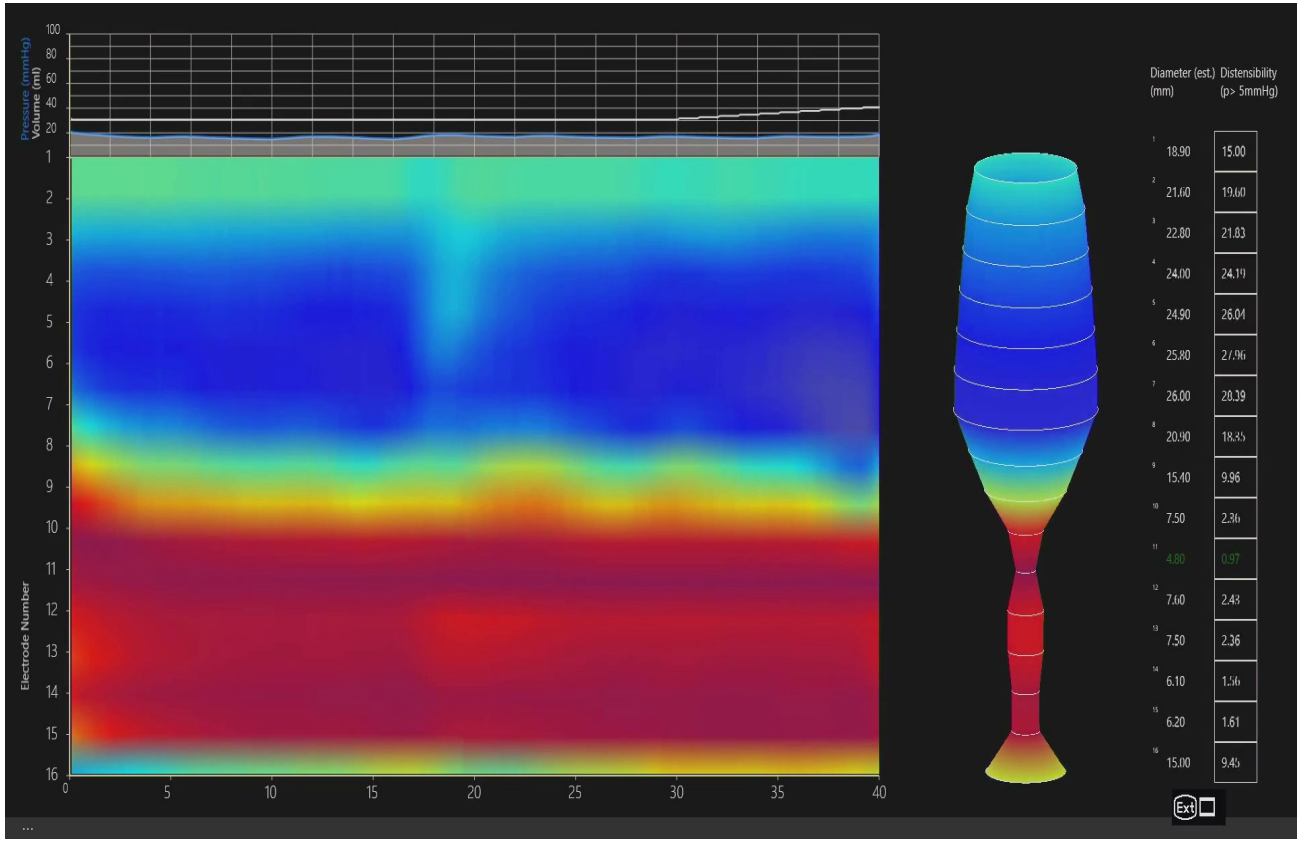


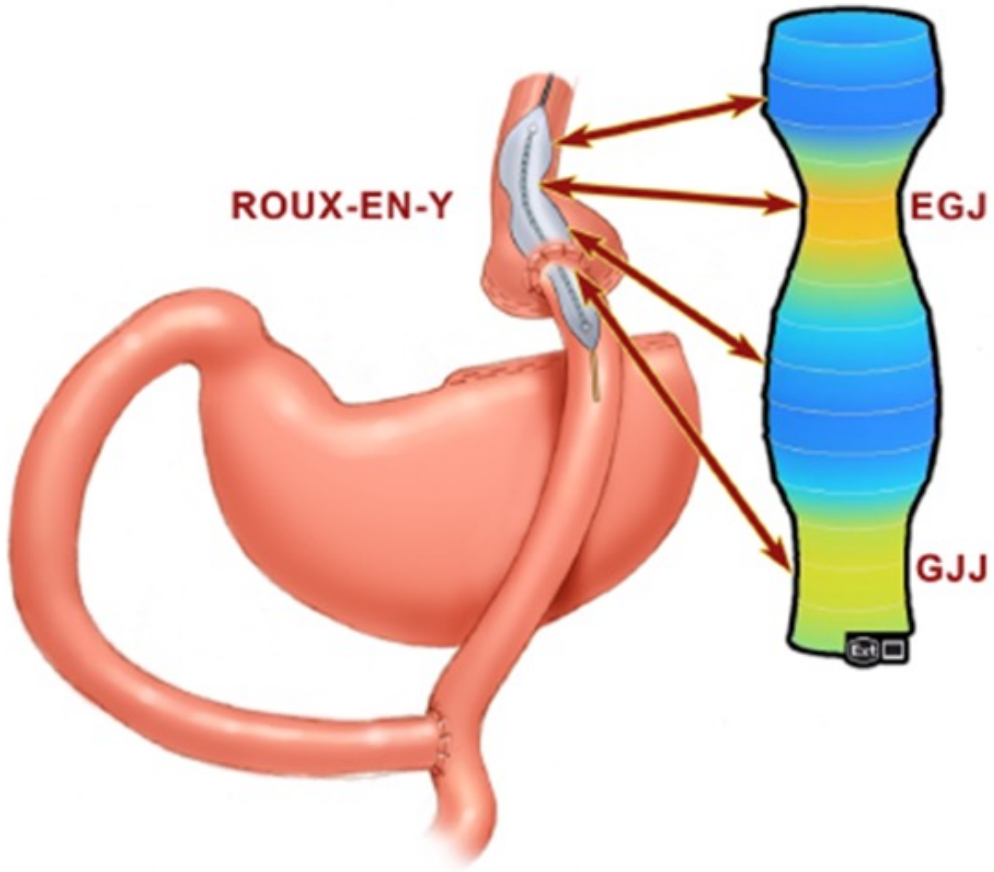
- Altered Esophageal Clearance
- Impact on LES complex
- Presence of hiatal hernia
- Impact on proximal cardia relaxation
- Increased intragastric pressure
- Anatomic abnormalities of procedure

Upper Endoscopy



GERD after RYGB

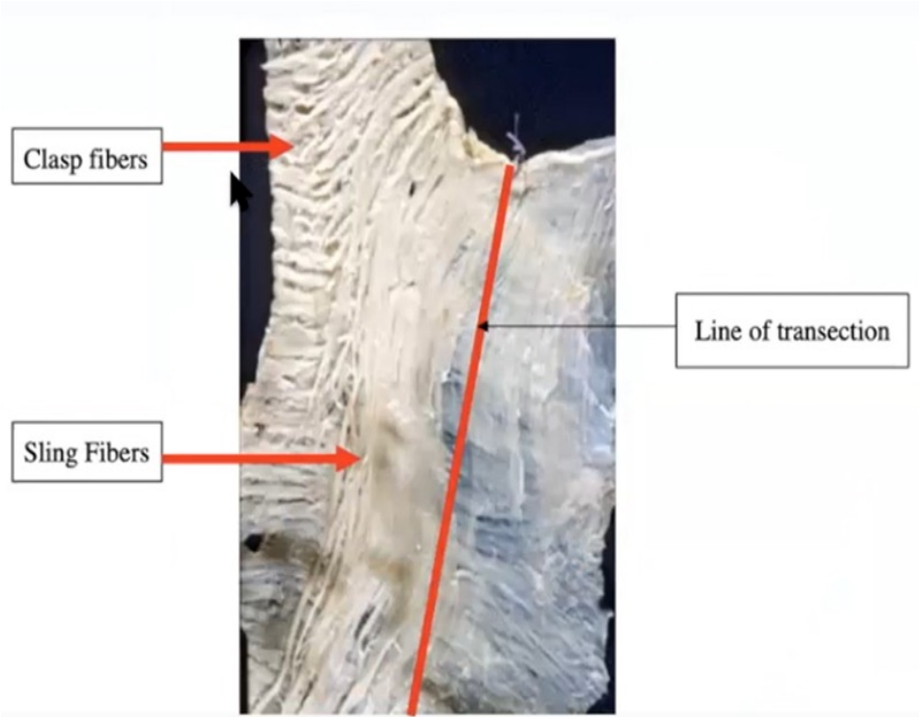




GERD after bariatric surgery pathophysiology short-term

Data on pathophysiologic changes after bariatric surgery is limited (small studies, conflicting, short term-follow-up)

- **Meta-analysis:** 27 studies
- **612** sleeve patients **470** RYGB
- **Physiology:** pH or manometry before and at least 1 month after surgery
- **Outcomes:** Changes in esophageal pH and manometric parameters compared to baseline before surgery



Jaruvongvanich V, et al. CTG 2020

Results: Sleeve Gastrectomy

	Parameters	SG N	SG Pooled outcome (95% CI)	SG I^2 (%)
Manometry	LES resting pressure (mm Hg)	10	**−3.55 (−6.35 to −0.75)**	93
	LES length (cm)	5	0.14 (−0.11 to 0.39)	91
	Esophageal body amplitude (mm Hg)	1	**−23.30 (−33.97 to −8.63)**	Inestimable
	Ineffective peristalsis (%)[a]	3	**2.82 (1.34 to 5.98)**	0
	Intragastric pressure (mm Hg)	6	0.78 (−3.87 to 5.42)	96
pH test	DeMeester score	9	5.46 (−1.26 to 12.18)	96
	AET, total (%)	10	**1.95 (0.23 to 3.67)**	96
	AET, recumbent (%)	5	**2.64 (0.82 to 4.45)**	90
	AET, upright (%)	5	1.79 (−0.68 to 4.25)	95
	Reflux episodes, total (n)	6	**15.98 (0.05 to 31.90)**	93
	Reflux episodes, total acid (n)	6	**5.07 (−2.26 to 12.41)**	87
	Reflux episodes, total nonacid (n)	6	**11.65 (5.59 to 17.71)**	82
	Reflux episodes, recumbent (n)	2	**5.79 (−1.22 to 12.80)**	52
	Reflux episodes, upright (n)	2	2.60 (−16.97 to 22.16)	91

Manometry:

- ↓LES pressure
- ↓Esophageal amplitude
- ↑Ineffective peristalsis

pH:

- ↑Total AET, ↑recumbent AET
- ↑Total reflux, ↑recumbent reflux episodes

RYGB

	Parameters	RYGB N	RYGB Pooled outcome (95% CI)	RYGB I^2 (%)
Manometry	LES resting pressure (mm Hg)	10	−0.15 (−0.86 to 0.55)	51
	LES length (cm)	6	0.01 (−0.09 to 0.11)	68
	Esophageal body amplitude (mm Hg)	4	−0.31 (−14.36 to 13.74)	85
	Ineffective peristalsis (%)[a]	3	**2.41 (1.38 to 4.20)**	12
	Intragastric pressure (mm Hg)	1	**−7.00 (−8.60 to −5.40)**	Inestimable
pH test	DeMeester score	7	**−16.65 (−22.36 to −10.93)**	99
	AET, total (%)	5	**−3.88 (−5.47 to −2.28)**	97
	AET, recumbent (%)	**1**	**−1.64 (−2.65 to −0.64)**	**0**
	AET, upright (%)	**1**	**−5.44 (−6.13 to −4.76)**	**34**
	Reflux episodes, total (n)	4	−18.06 (−52.64 to 16.52)	100
	Reflux episodes, total acid (n)	2	**−34.79 (−69.30 to −0.28)**	100
	Reflux episodes, total nonacid (n)	2	**43.21 (39.33 to 47.10)**	94
	Reflux episodes, recumbent (n)	—	—	—
	Reflux episodes, upright (n)	—	—	—

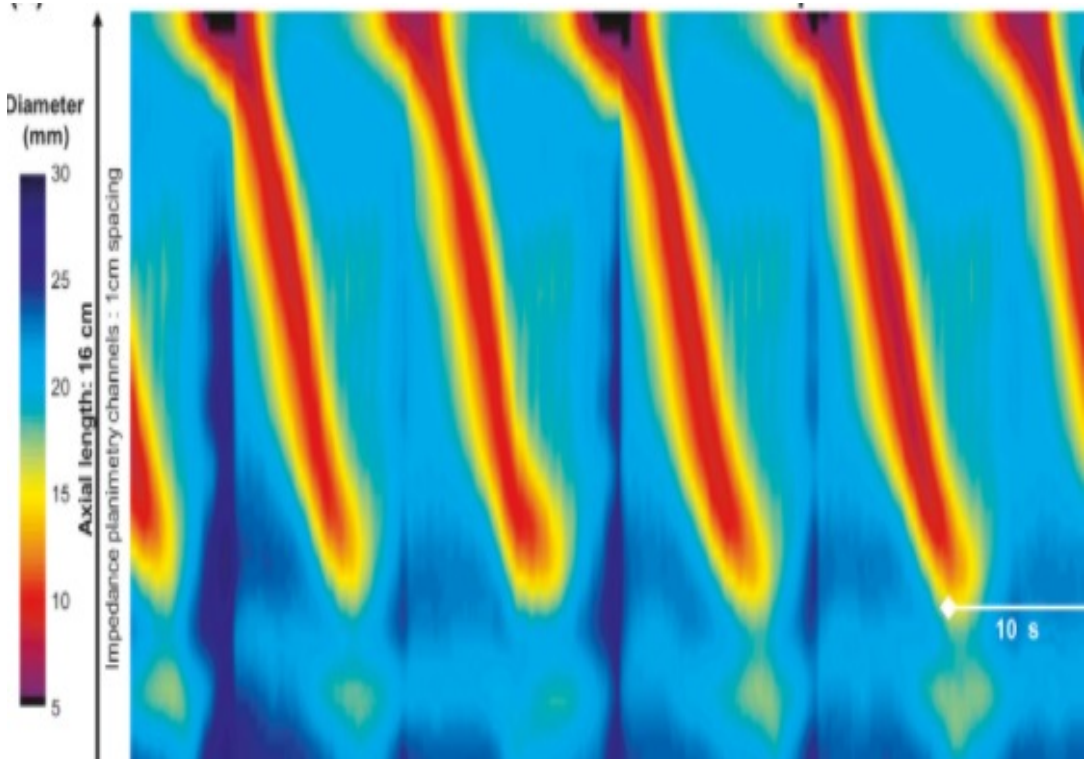
Manometry:

- ↑Ineffective peristalsis

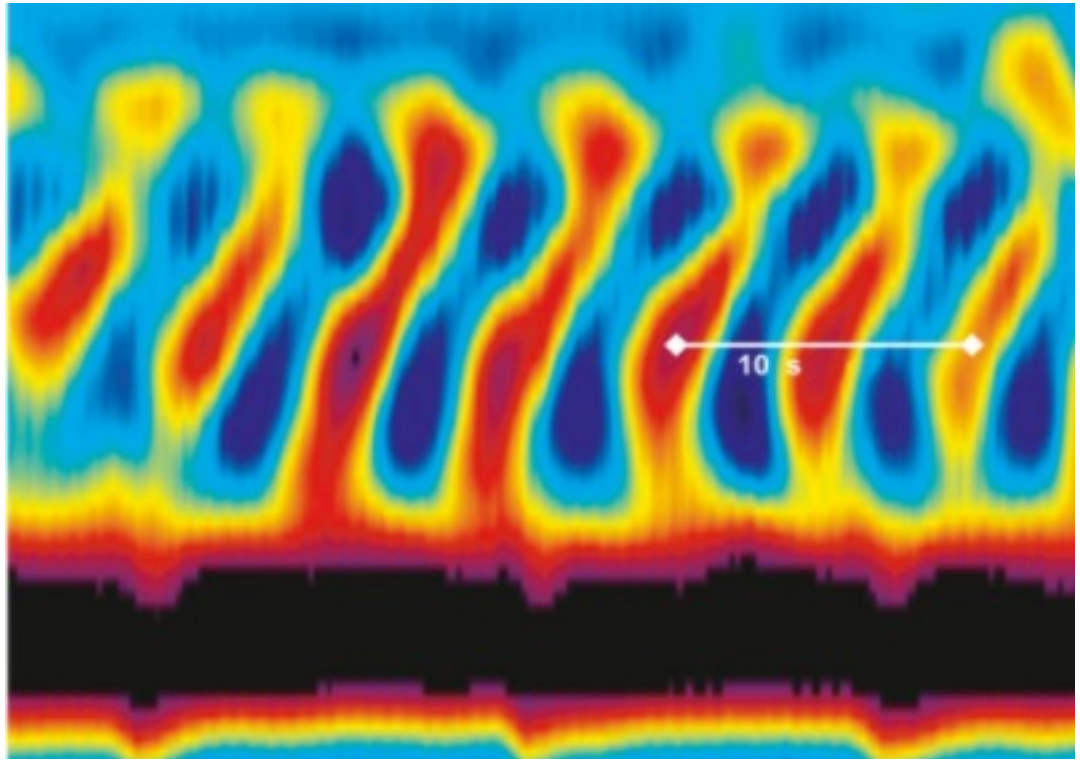
pH:

- ↓Total AET, ↓recumbent AET and ↓upright AET
- Unchanged total reflux episodes, ↓acid reflux, ↑nonacid reflux episodes

Proposed Esophageal Clearance Progression: Long-Term

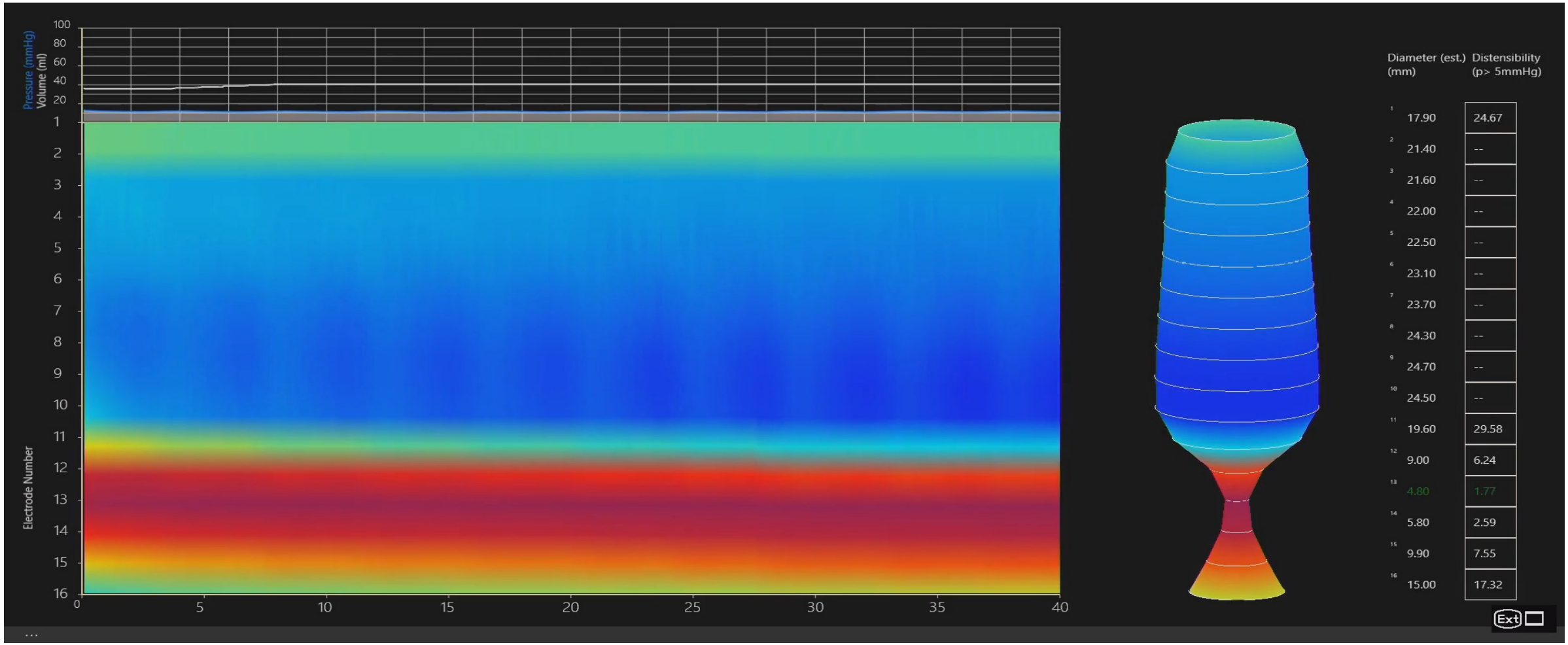


Normal RAC



RRC

Proposed Esophageal Clearance Progression: Long-Term

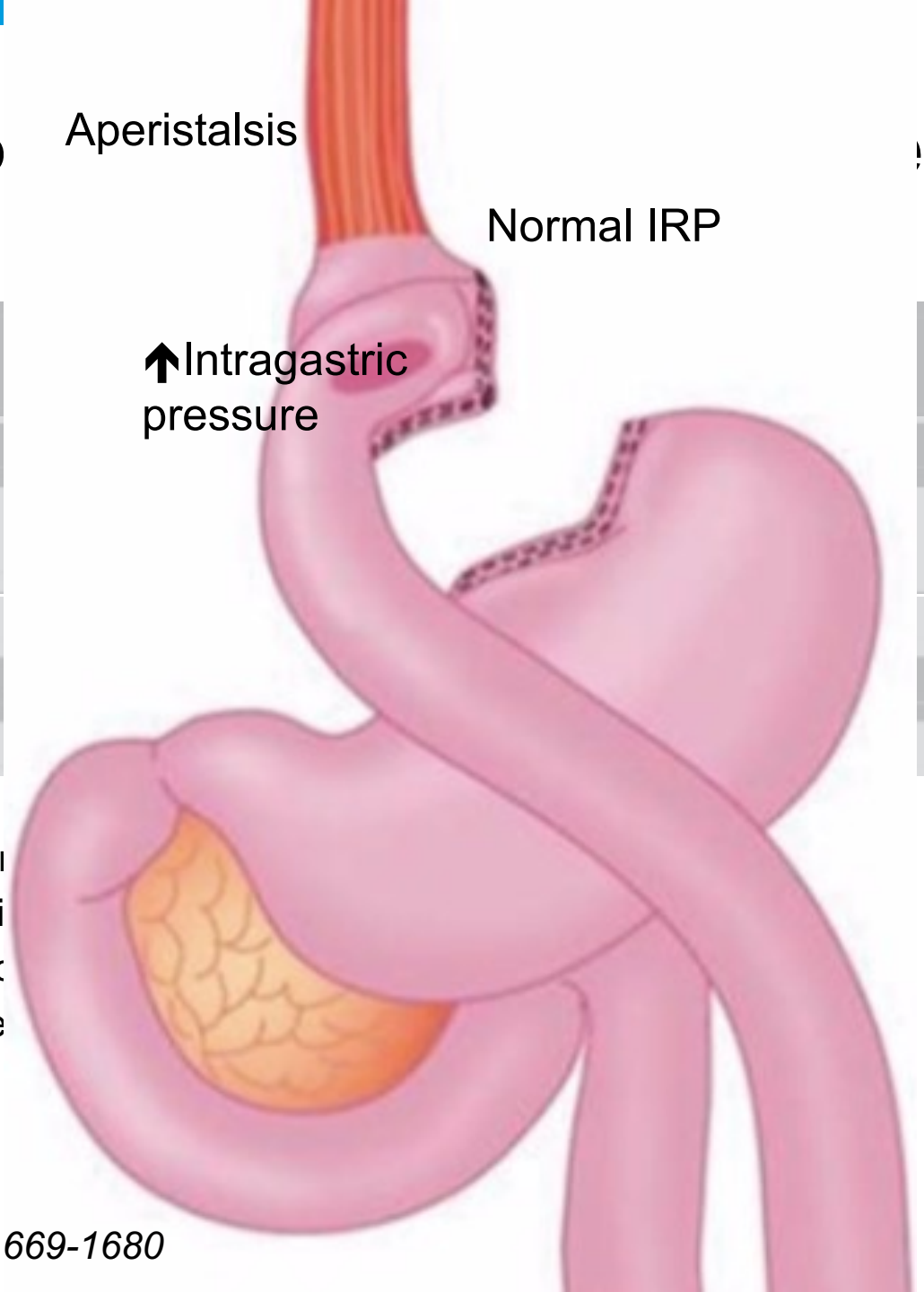


POSED (Posto… Dysfunction)

Aperistalsis

Normal IRP

↑Intragastric pressure



	LSG vs RYGB, *P* value	Presurgical vs postsurgical, *P* value
BMI at manometry, kg/m^2	0.2187	<0.0001
Median time from surgery to manometry, yr (IQR)	<0.0001	—
Any Chicago classification abnormality	0.8311	0.0246
Achalasia (types I-III)	0.5146	0.0811
POSED	0.3440	0.1435

Survey of postbariatric patients (r…

- 38.4% reported dysphagi…
- No difference between pc…
- A time-dependent manne…

Am J Gastroenterol. 2020 Oct;115(10):1669-1680

GERD after Sleeve Clinical Studies

GERD

From: **Effect of Laparoscopic Sleeve Gastrectomy vs Laparoscopic Roux-en-Y Gastric Bypass on Weight Loss in Patients With Morbid ObesityThe SM-BOSS Randomized Clinical Trial**

JAMA. 2018;319(3):255-265. doi:10.1001/jama.2017.20897

N = 101 Randomize to Sleeve

- 44/101 prior GERD – 31.8% worsened
- 57/101 no prior GERD – 31.6% De Novo GERD
- 9 converted to RYGB because of severe GERD
- Diagnosis only based on symptoms

ELSEVIER

Surgery for Obesity and Related Diseases 14 (2018) 751–756

Original article

Lack of correlation between gastroesophageal reflux disease symptoms and esophageal lesions after sleeve gastrectomy

N = 144 prospective series (66 months median follow-up)

- GERD symptoms from 40.9% pre to 70.2% post
- PPI use from 24.3% pre to 63.9%
- Erosive esophagitis – 59.8% on endoscopy
- Non-dysplastic Barrett's esophagus – 13.1%
- No correlation between symptoms and endoscopic findings

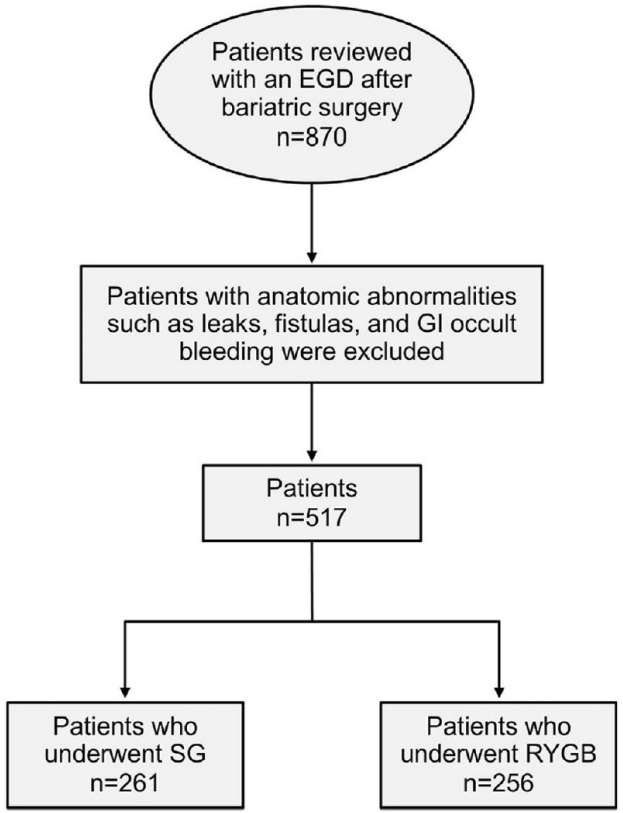
Ann Surg. 2019 Mar 20. Meta-analysis

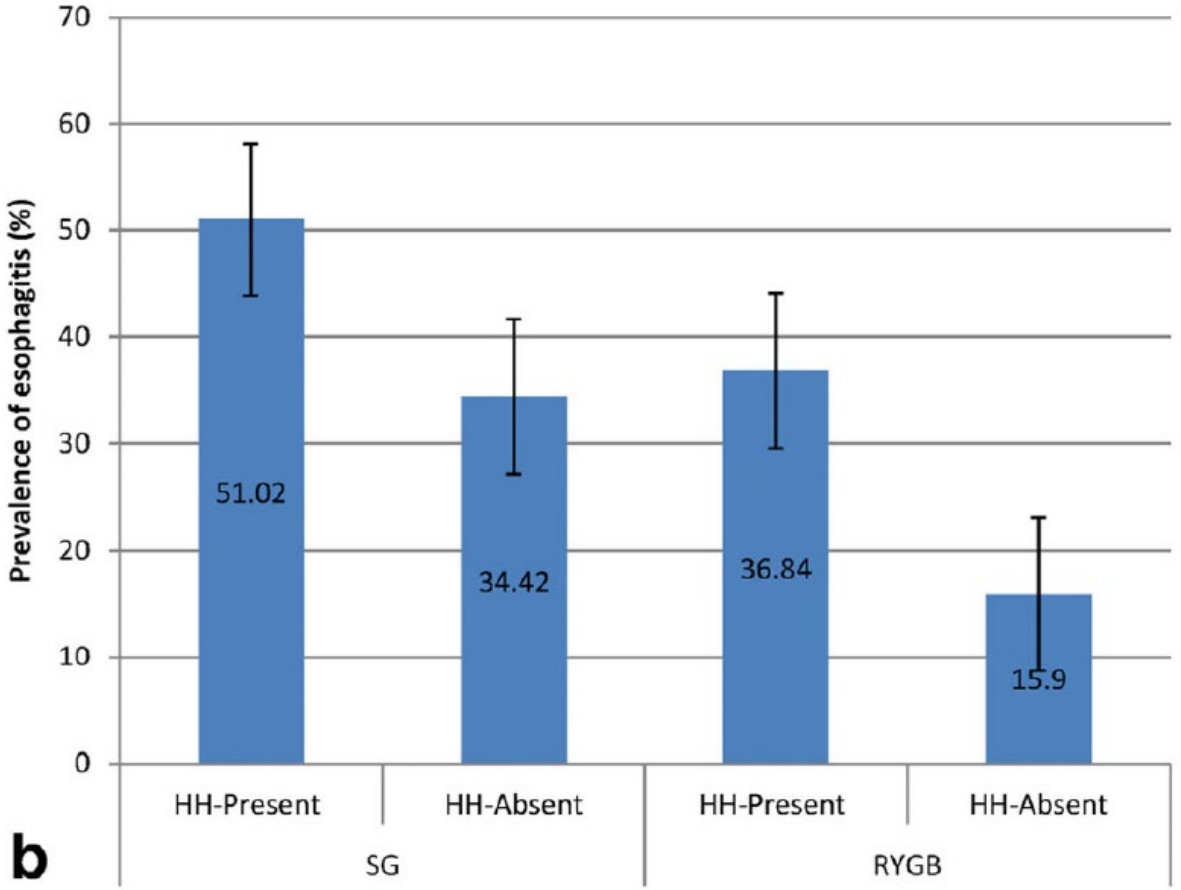
- 46 studies totaling 10,718 patients were included.
- de novo reflux after sleeve 23%
- The long-term prevalence of esophagitis was 28%
- Barrett's esophagus 8%
- Conversion to RYGB for severe reflux 4%

Yeung KTD. Ann Surg 2020

Sleeve + Esophagitis + Hiatal Hernia

Obesity Surgery (2020) 30:161–168





Sleeve to RYGB Conversion for GERD 30.4%

Indications and Outcomes of Conversion of Sleeve Gastrectomy to Roux-en-Y Gastric Bypass: A Systematic Review and Meta-Analysis

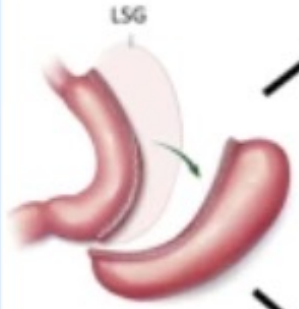
METHODS

- A literature search was performed from database inception to May 2020.
- Eligible studies reported indications for conversion, %total body weight loss (%TWL), and/or complications.

RESULTS

Indication of Conversion

30.4% for GERD



- BMI 38.5 kg/m² → 32.1 kg/m² at 1 year
- % TWL 22.8% at 1 year
- Complications rate:
  - <30 days = 16.4%
  - >30 days = 11.4%

- **17 studies**
- **556 patient**

52% for Insufficient Weight Loss or Weight Regain

CONCLUSIONS

- Conversion from SG to RYGB is an option that produces sufficient weight loss outcomes, and potential resolution of symptoms of GERD.
- Further indication-based studies are required to obtain a clearer consensus on the surgical management of patients seeking RYGB following SG.

IFSO

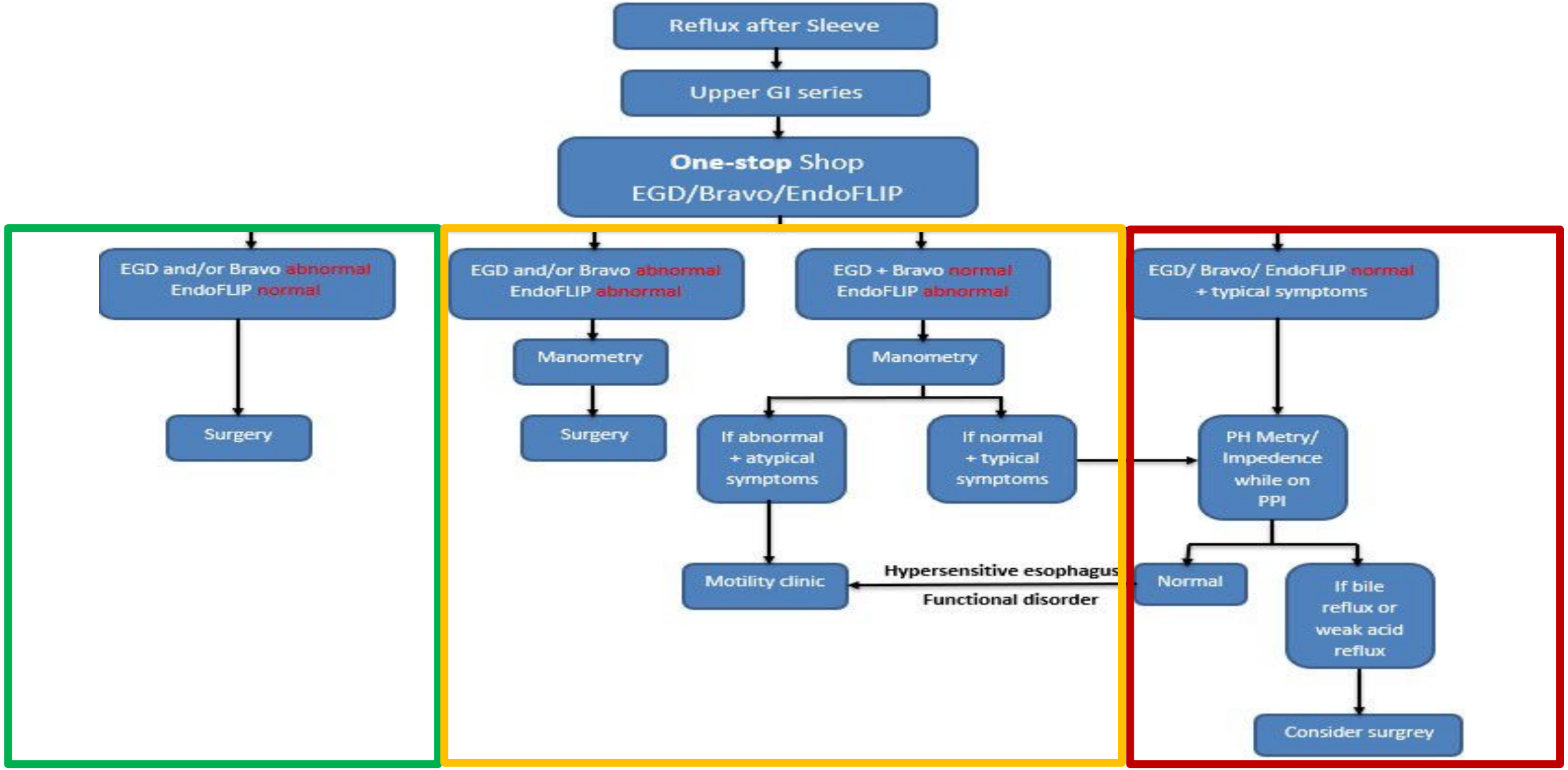
Authors: Matar R, Monzer N, Jaruvongvanich V, Abusaleh R, Vargas EJ, Maselli DB, Beran A, Kellogg T, Ghanem O, Abu Dayyeh BK

Title: Indications and outcomes of conversion of Sleeve Gastrectomy to Roux-en-Y Gastric Bypass: A Systematic Review and Meta-Analysis

Obes Surg.year 2021 Month April

OBESITY SURGERY
The Journal of Metabolic Surgery and Allied Care

GERD: Algorithmic approach to GERD symptoms after Bariatric Surgery



QUESTIONS