GERD FOLLOWING SLEEVE GASTRECTOMY & RYGB: IS THERE A WAY TO PREVENT IT?

DOTT.SSA LAVINIA AMATO

S.C. CHIRURGIA GENERALE

P.O. CITTA' DI CASTELLO-PG

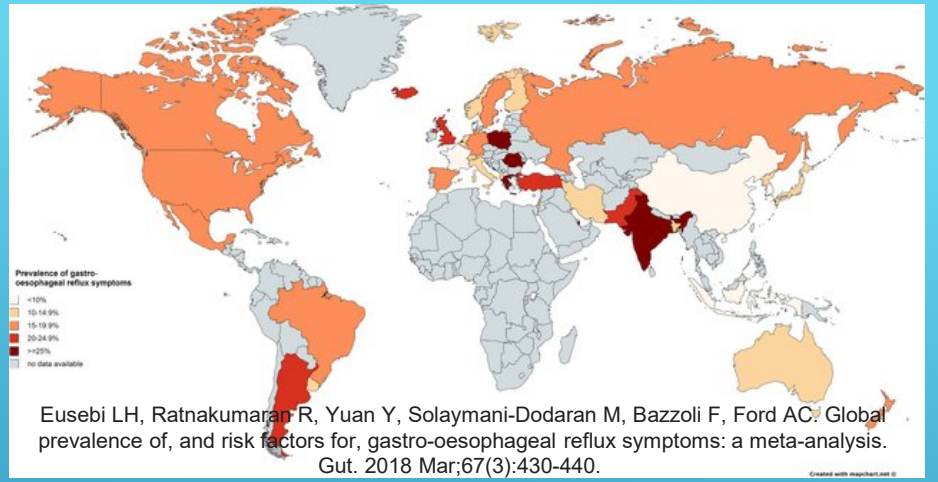
(RESP. CHIRURGIA BARIATRICA: DOTT. ALESSANDRO CONTINE)

- “The **overall burden** of GERD continued to worsen with the prevalent cases **increasing by 77.53%** from 441.57 million in 1990 to 783.95 million in 2019.”

- “BMI is associated with GERD symptoms in both normal weight and overweight individuals. Our findings suggest that **even modest weight gain among normal weight individuals may cause or exacerbate reflux symptoms**.”

- “Based on endoscopic and histopathologic appearance, GERD is **classified** into three different phenotypes: non-**erosive reflux disease, erosive esophagitis, and Barrett’s esophagus** ”

- **10–15%** of patients with gastroesophageal reflux disease will develop **Barrett’s esophagus** and 50% of subjects with Barrett’s or esophageal adenocarcinoma will report no history of gastroesophageal reflux symptoms”



Eusebi LH, Ratnakumaran R, Yuan Y, Solaymani-Dodaran M, Bazzoli F, Ford AC. Global prevalence of, and risk factors for, gastro-oesophageal reflux symptoms: a meta-analysis. Gut. 2018 Mar;67(3):430-440.

Ann Med. 2022; 54(1): 1372–1384.
Published online 2022 May 17. doi: 10.1080/07853890.2022.2074535
PMCID: PMC9122392
PMID: 35579516

Global, regional and national burden of gastroesophageal reflux disease, 1990–2019: update from the GBD 2019 study

Decai Zhang,[a,b] Shaojun Liu,[a,b] Zhaoqi Li,[a,b] and Rui Wang[a,b]

N Engl J Med. Author manuscript; available in PMC 2009 Nov 25.
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N Engl J Med. 2006 Jun 1; 354(22): 2340–2348.
doi: 10.1056/NEJMoa054391
PMCID: PMC2782772
NIHMSID: NIHMS148868
PMID: 16738270

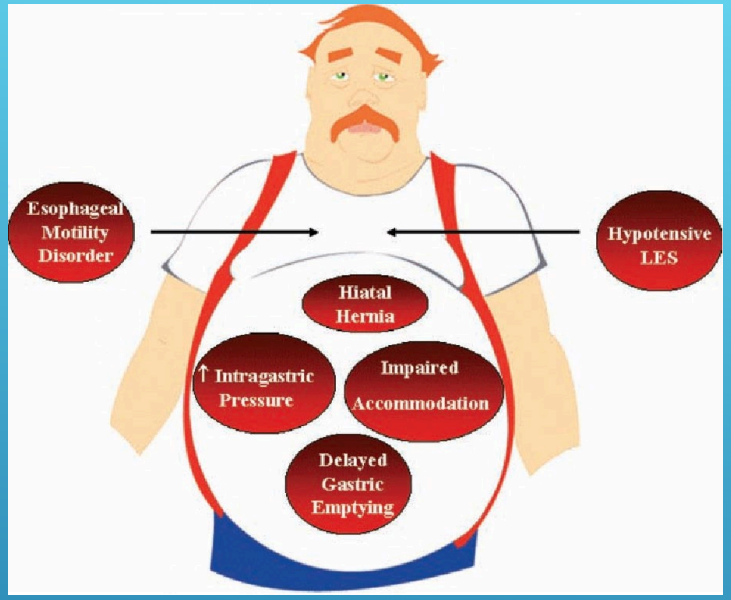
Association Between Body Mass Index and Gastroesophageal Reflux Symptoms in Both Normal Weight and Overweight Women

Brian C. Jacobson, MD, MPH, Samuel C. Somers, MD, MMSC, Charles S. Fuchs, MD, MPH, Ciarán P. Kelly, MD, and Carlos A. Camargo, Jr., MD, DrPH

Practice Guideline > Am J Gastroenterol. 2016 Jan;111(1):30-50; quiz 51.
doi: 10.1038/ajg.2015.322. Epub 2015 Nov 3.

ACG Clinical Guideline: Diagnosis and Management of Barrett's Esophagus

Nicholas J Shaheen [1], Gary W Falk [2], Prasad G Iyer [3], Lauren B Gerson [4]; American College of Gastroenterology



Comparative Study > Am J Gastroenterol. 2005 Jun;100(6):1243-50.
doi: 10.1111/j.1572-0241.2005.41703.x.

Obesity is an independent risk factor for GERD symptoms and erosive esophagitis

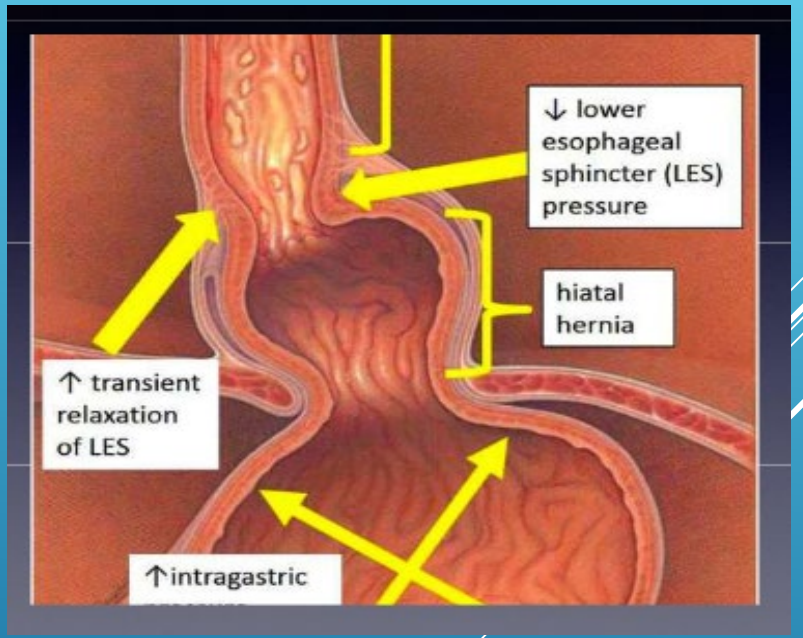
Hashem B El-Serag [1], David Y Graham, Jessie A Satia, Linda Rabeneck

- Jacobsen et al reported that **increasing BMI for >3.5 points** compared to no weight change **increases the risk of developing GERD** and the frequency of related symptoms.
- **Long term complications** including **erosive esophagitis, Barrett's esophagus and esophageal adenocarcinoma are associated with Obesity**.
- Associations of Barrett's and obesity have been demonstrated by Stein and others who established that **for each 5-unit increase in BMI, the risk of Barrett's increased by 35%**.
- **Abdominal obesity ("central obesity") has been shown to be a more specific risk factor for Barrett's**.

MECHANISMS OF REFLUX

- **Hiatal hernia**, a **short intraabdominal esophagus**, **weakness of the diaphragmatic crura/phreno-esophageal ligament**, or **elevated intraabdominal pressure** are important risk factors in the development of GERD.

- **Central Abdominal obesity** can raise intraperitoneal pressure **significantly increasing intragastric pressure and transient relaxations of LES** which become inappropriate to the gastric volume



REFLUX MECHANISM FOLLOWING SLEEVE GASTRECTOMY

- 2/3 gastrectomy of the body and fundus of the stomach are removed and it's typically performed over a calibration tube. **The size of tube does not correlate with weight loss, but does correlate with symptoms of reflux**.
- The permissive reflux state post Sleeve Gastrectomy can be explained by a number of **anatomic and functional changes**:
- blunting of the angle of His;
- intrathoracic migration of the gastric tube resulting in de novo hiatal hernia formation;
- resecting the greater curvature reduces gastric compliance, resulting in an increase in intragastric pressures and provoking an increase in transient lower esophageal sphincter relaxations;
- disruption of the antral pacemaker and autonomic connections can result in reduced contractions and decreased gastric accommodation;

SLEEVE GASTRECTOMY AND REFLUX

Meta-Analysis > Ann Surg. 2020 Feb;271(2):257-265. doi: 10.1097/SLA.0000000000003275.

Does Sleeve Gastrectomy Expose the Distal Esophagus to Severe Reflux?: A Systematic Review and Meta-analysis

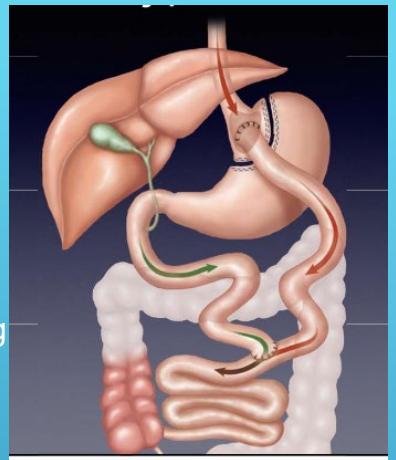
Kai Tai Derek Yeung [1], Nicholas Penney, Leanne Ashrafian, Ara Darzi, Hutan Ashrafian

- Meta-analysis found that the incidence of **postoperative GERD after sleeve was 19%.**
- **de novo reflux was 23%.**
- The long-term prevalence of **esophagitis was 28%.**
- **Barrett's Esophagus was 8%.**
- **4%** of all patients **required conversion** to RYGB for severe reflux.

SURVEILLANCE AFTER SLEEVE ???

It remains unclear whether pts who develop new or worsening reflux should be submitted to some manner of surveillance!!

REFLUX MECHANISM FOLLOWING RYGBP



- Roux-en-Y gastric bypass appears to have **the most beneficial effect on GERD**
- LRYGB **diverts bile and the bulk of acid away from the gastric pouch and esophagus** due to the long
- **very little acid is produced in the cardia-based gastric pouch**.
- **surgically induced weight loss may diminish systemic inflammation**, which may contribute to improvement in metaplastic changes in the esophagus

BARRETT'S AND GASTRIC BYPASS

- Patients with **erosive esophagitis had a statistically significant resolution after RYGB**.

• Barrett's esophagus **was improved or even resolved** in many patients without acquiring significance and appears to **prevent progression**.

- Long-term surveillance data is necessary to define the certain evolution of EE and BE after GBP.

ATM | Annals of Translational Medicine

Ann Transl Med. 2020 Mar; 8(Suppl 1): S11.
doi: 10.21037/atm.2019.09.15
PMCID: PMC7154328
PMID: 32309415

Bariatric surgery and gastroesophageal reflux disease

Darius Ashrafi, [1] Emma Osland, [2,3] and Muhammed Ashraf Memon [1,4,5,6,7]

Obes Surg. 2020 Apr;30(4):1194-1199. doi: 10.1007/s11695-019-04333-1.

Impact of Gastric Bypass on Erosive Esophagitis and Barret's Esophagus

Franco Signorini [1], German Viscido [2], María Cecilia Anastasía Bocco [2], Lucio Obeide [2], Federico Moser [2]

BARIATRIC SURGERY AS BOTH THE CAUSE & THE CURE OF GERD

Obesity as the cause of GERD

Gastroesophageal reflux disease (GERD) is a common, chronic condition which can significantly impact quality of life and lead to serious complications

Obesity is a well-established risk factor for GERD and often improves with weight loss and bariatric surgery

Bariatric surgery as the treatment of GERD

Roux-en-Y gastric bypass is highly effective for treatment of GERD in the morbidly obese population

GERD Obesity Bariatric surgery

Bariatric surgery as the cause of GERD

As the incidence of bariatric surgery rises, persistent and de novo reflux following bariatric surgery has become a topic of concern

Management of GERD following bariatric surgery

Lifestyle modifications, dietary education, optimization of acid suppression medications, treatment of postoperative complications, repair of hiatal hernia if present, conversion to Roux-en-Y gastric bypass, magnetic sphincter augmentation, endoscopic surveillance for Barrett's esophagus

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Gastroesophageal Reflux Disease in Obesity: Bariatric Surgery as Both the Cause and the Cure in the Morbidly Obese Population

by Muaaz Masood [1], Donald Low [2], Shanley B. Deal [3] and Richard A. Kozarek [1,4,*]

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J. Clin. Med. **2023**, *12*(17), 5543; https://doi.org/10.3390/jcm12175543

Submission received: 22 July 2023 / Revised: 11 August 2023 / Accepted: 18 August 2023 /

Table 1. Mechanical factors that have been suggested to predispose patients with obesity to gastroesophageal reflux disease.

Pathophysiologic Mechanisms That Predispose Obese Patients to Reflux
Transient lower esophageal sphincter relaxations
Increased intra-abdominal pressure
Augmented gastroesophageal pressure gradient
Increased prevalence of hiatal hernia

Table 5. Proposed mechanisms for de novo or increased gastroesophageal reflux following bariatric surgery.

Proposed Mechanisms for De Novo or Increased Gastroesophageal Reflux following Bariatric Surgery	
Sleeve Gastrectomy	**Roux-en-Y Gastric Bypass**

• Loss of the antireflux barrier
  ○ Disruption of the esophagogastric junction, gastroesophageal flap valve, the angle of His, gastric sling fibers, fundal resection
	• Functional impairment of the gastroesophageal junction
	  ○ Baseline hiatal hernia

• Functional impairment of the gastroesophageal junction ○ Baseline hiatal hernia	• Anastomotic stenosis • Large gastric remnant • Gastrogastric fistula

• Increased intragastric pressure
  ○ Narrow sleeve dimensions
  ○ Sleeve stenosis, angulation or kinking
  ○ Incorporation of the antrum into the sleeve resection
  ○ Overfilling of sleeve due to a large meal size	

• Sleeve leak	

- With the recent rise in bariatric surgery, **especially SG**, **persistent and de novo reflux** following bariatric surgery has become a topic of concern.

- **Management** of post-bariatric surgery GERD includes lifestyle modifications, optimization of PPI and H2RAs, treatment of postoperative complications and repair of hiatal hernia if present.

- **Conversion to Roux-en-Y currently has the most robust evidence** to support its safety and efficacy for the treatment of medically refractory GERD post-SG.

- Other options include magnetic sphincter augmentation, though data regarding safety and efficacy are limited.

Table 6. An overview of the literature on the effect of conversion from sleeve gastrectomy to Roux-en-Y gastric bypass on gastroesophageal reflux disease. ACM = acid suppression medication, GERD = gastroesophageal reflux disease, RYGB = Roux-en-Y gastric bypass, N/R = not reported.

The Effect of Conversion from Sleeve Gastrectomy to Roux-en-Y Gastric Bypass on Gastroesophageal Reflux Disease

Author	Year	Journal	Article Type	Conversion Rate to RYGB for GERD (%)	Effect on GERD Symptoms and Use of Acid Suppression Medications
Langer et al. [136]	2010	Obesity Surgery	Retrospective review	11	100% of patients with severe reflux discontinued ACM
Salminen et al. [137]	2018	JAMA	Randomized clinical trial	6	N/R
Parmar et al. [138]	2017	Obesity Surgery	Prospective study	45	100% of patients reported improvement in GERD symptoms 80% of patients were able to discontinue ACM
Abdemur et al. [139]	2016	Surgery for Obesity and Related Diseases	Retrospective review	0.8	66% of patients had complete resolution of GERD symptoms
Hendricks et al. [140]	2016	Surgery for Obesity and Related Diseases	Retrospective review, comparativ study	10.5	75% of patients had complete resolution of GERD symptoms 25% of patients had partial resolution
Gautier et al. [141]	2013	Obesity Surgery	Retrospective review	33.3	100% of patients discontinued ACM No recurrence of GERD was noted
Strauss et al. [142]	2023	Surgical Endoscopy	Retrospective review	72.2	80.2% of patients had improvement in GERD symptoms 19.4% of patients were able to discontinue ACM
Felsenreich et al. [144]	2022	Obesity Surgery	Retrospective review	34.2	29.9% of patients reported GERD symptoms following conversion
Peng et al. [145]	2020	Surgery for Obesity and Related Diseases	Systematic Review and Meta-analysis	N/R	57.1–100% had remission or improvement in GERD symptoms

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Table 3. Literature comparison of sleeve gastrectomy and Roux-en-Y gastric bypass in terms of remission of gastroesophageal reflux symptoms and the use of acid suppression medications. ACM = acid suppression medications, EE = erosive esophagitis, GERD = gastroesophageal reflux disease, OR = odds ratio, PPI = proton pump inhibitors, (L)RYGB = (laparoscopic) Roux-en-Y gastric bypass, (L)SG = (laparoscopic) sleeve gastrectomy.

Comparison of Sleeve Gastrectomy and Roux-en-Y Gastric Bypass in Terms of Gastroesophageal Reflux Symptom Remission and the Use of Acid Suppression Medications

Author	Year	Journal	Article Type	Number of Cases/ Studies	GERD Symptom Remission—RYGB	Pre- and Post-Operative Usage of Acid Suppression Medications (ACM)	GERD Symptom Remission—SG	*p*-Value	Additional Comments
Peterli et al. [50]	2018	JAMA	Randomized controlled trial	217	60.4%	N/R	25%	0.002	De novo reflux in 31.6% after SG vs. 10.7% after RYGB ($p = 0.01$)
Alghamdi et al. [53]	2022	Frontiers in Surgery	Systematic review, meta-analysis	16	Odds ratio of GERD remission = 3.16 for LRYGB compared to LSG, $p = 0.003$, heterogeneity N/A Usage of ACM was not reported				There was no significant statistical difference between LRYGB and LSG with regard to new-onset GERD; heterogeneity was noted
Gu et al. [11]	2019	Obesity Surgery	Systematic review, meta-analysis	23	OR for GERD after LSG compared to LRYGB = 5.10, $p < 0.001$ LRYGB had a better effect on GERD compared to LSG, OR = 0.19, $p < 0.001$				
DuPree et al. [16]	2014	JAMA Surgery	Retrospective review	4832	62.8%	N/A	15.9%	$p < 0.001$	New-onset GERD was noted in 8.6% in the LSG group
Sheppard et al. [12]	2015	Obesity Surgery	Retrospective review	387	Pre-operative PPI use in LSG: 28% → 2% were able to discontinue PPI after SG Pre-operative PPI use in LRGYB: 32% → 33% were able to discontinue PPI after RYGB				
Matar et al. [15]	2020	Obesity Surgery	Retrospective review	517	EE prevalence higher after SG than RYGB (37.9% vs. 17.6%, $p = 0.0001$)				

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Currently and going forward, more precise, standardized methods are warranted to document GERD following bariatric surgery, due to the variability in the reported literature. As bariatric surgery can be both the cure and the cause for GERD in the morbidly obese population, **careful patient selection and proper surgical technique are paramount for a favorable outcome.**

WHICH ONE IS BETTER?

Review > Surg Open Sci. 2021 Nov 19:7:46-51. doi: 10.1016/j.sopen.2021.11.006. eCollection 2022 Jan.

Evolution of gastroesophageal reflux disease symptoms after bariatric surgery: A dose–response meta–analysis

Abdel-Naser Elzouki [1 2 3], Muhammad-Aamir Waheed [4], Salah Suwileh [1], Islam Elzouki [5], Hisham Swehli [1], Maryam Alhitmi [3], Mona Saad [3], Elmukhtar Habas [1], Suhail A Doi [3], Mohammed I Danjuma [1 2 3]

«…Bariatric **Redo-surgery** may **improve GERD symptoms** in obese pts who underwent laparoscopic sleeve gastrectomy; however, the **most favorable effect is likely to be found after Roux-en-Y gastric bypass** surgery…»

WHAT ABOUT GERD FOLLOWING RYGB???

«…Although the majority of patients with GERD after RYGB can be effectively managed with medical therapy, **some may require endoscopic or surgical treatment**. **Critical technical elements of RYGB should be considered to reduce the risk of postoperative GERD**…

J Laparoendosc Adv Surg Tech A. 2024 Feb;34(2):167-172. doi: 10.1089/lap.2023.0289. Epub 2023 Dec 28.

Gastroesophageal Reflux Disease After Roux-en-Y Gastric Bypass: Pathophysiology and Management

Manuela Monrabal Lezama [1], Camila Bras Harriott [1], Fernando A M Herbella [2], Francisco Schlottmann [1 3]

Meta-Analysis > Obes Surg. 2019 Dec;29(12):4105-4113. doi: 10.1007/s11695-019-04218-3.

Relationship Between Bariatric Surgery and Gastroesophageal Reflux Disease: a Systematic Review and Meta-analysis

Lihu Gu [1], Bangsheng Chen [2], Nannan Du [3], Rongrong Fu [4], Xiaojing Huang [3], Feiyan Mao [1], Parikshit Asutosh Khadaroo [5], Shenbiao Zhao [6]

Review > Curr Opin Gastroenterol. 2014 Jul;30(4):434-8. doi: 10.1097/MOG.0000000000000083.

Effects of bariatric surgery on gastroesophageal reflux

Radu Tutuian [1]

«…The **presence of GERD might represent a relative contraindication for sleeve gastrectomy or gastric banding or both**. **Gastric bypass might be the procedure of choice in morbid obese patients with GERD symptoms or findings or both…»**

«…Compared with LSG, LRYGB had a better effect on GERD (OR = 0.19, 95% CI 0.12-0.30, **p < 0.001**). **LRYGB was more effective for treating GERD in obese patients than LSG and the incidence of newly onset GERD after LRYGB was lower…»**

Case Reports > Rozhl Chir. 2019 Spring;98(5):214-218.

An alternative method of surgical treatment in refractory GERD following laparoscopic sleeve gastrectomy

P Ostruszka, P Ihnát, L Tulinský, P Vávra

PMID: 31159543

WHAT IF RYGB ISN'T POSSIBLE?

Abstract

Obesity has become a global problem with increasing prevalence. Undoubtedly, bariatric surgery is the most effective way to treat morbid obesity. Laparoscopic sleeve gastrectomy (LSG) is currently the most commonly performed bariatric procedure worldwide. The prevalence of gastroesopha-geal reflux disease (GERD) is also increasing, a close association with increasing prevalence of obesity being regarded as the main cause of this trend. The relationship between LSG and GERD is still unclear, at least controversial. If GERD occurs in the postoperative period, the first therapeutic intervention is initiation of proton pump inhibitors (PPI) treatment, which is effective in the vast majority of patients. In patients resistant to this treatment, conversion to laparoscopic Roux en Y gastric bypass (LRYGB) is usually necessary. The authors present the case report of a patient who developed GERD in the longer postoperative period and conversion to LRYGB was not appropriate due to previous complications and surgical procedures. Therefore, this patient was managed operatively by an alternative method - hiatoplasty with partial posterior fundoplication. The success of the treatment was confirmed clinically by disappearance of GERD symptomatology postoperatively even after PPI discontinuation. LRYGB is the method of choice for GERD after restrictive bariatric procedures. However, some patients are not suitable for conversion to LRYGB, and alternative treatment options are therefore needed.

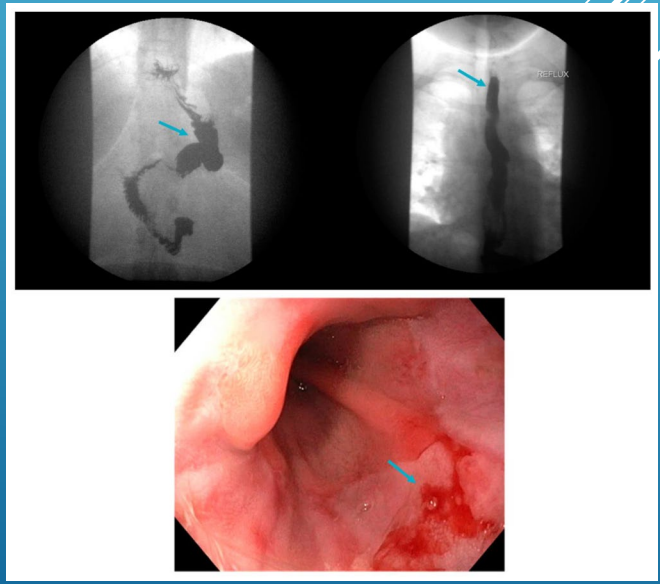
J Gastrointest Surg. 2022 May;26(5):1015-1020. doi: 10.1007/s11605-021-05207-7. Epub 2022 Jan 8.

Predictive Factors for Developing GERD After Sleeve Gastrectomy: Is Preoperative Endoscopy Necessary?

Omar Bellorin [1], James C Senturk [2 3], Mariana Vigiola Cruz [1], Gregory Dakin [1], Chequevara Afaneh [1]

- **On multivariate analysis, the strongest predictors of GERD after SG were endoscopically identified esophagitis** (odds ratio [OR] 2.79; 95% confidence interval [CI]1.17-6.69; p = 0.02) **and biopsy-proven esophagitis** (OR 2.80; 95% CI 1.06-7.37; p = 0.04). Male patients were less likely to develop GERD after SG (OR 0.23; 95% CI 0.06-0.85; p = 0.03).

- «…Conclusion: **Our findings strengthen the rationale for routine preoperative endoscopy and highlight critical clinical and endoscopic criteria that should prompt consideration of alternatives to SG for weight loss**…»



Review > Gastroenterol Rep (Oxf). 2023 Jun 9:11:goad028. doi: 10.1093/gastro/goad028. eCollection 2023.

Turnkey algorithmic approach for the evaluation of gastroesophageal reflux disease after bariatric surgery

Omar M Ghanem [1], Rabih Ghazi [2], Farah Abdul Razzak [2], Fateh Bazerbachi [3], Karthik Ravi [2], Leena Khaitan [4], Shanu N Kothari [5], Barham K Abu Dayyeh [2]

THE IMPORTANCE OF EGD!!!

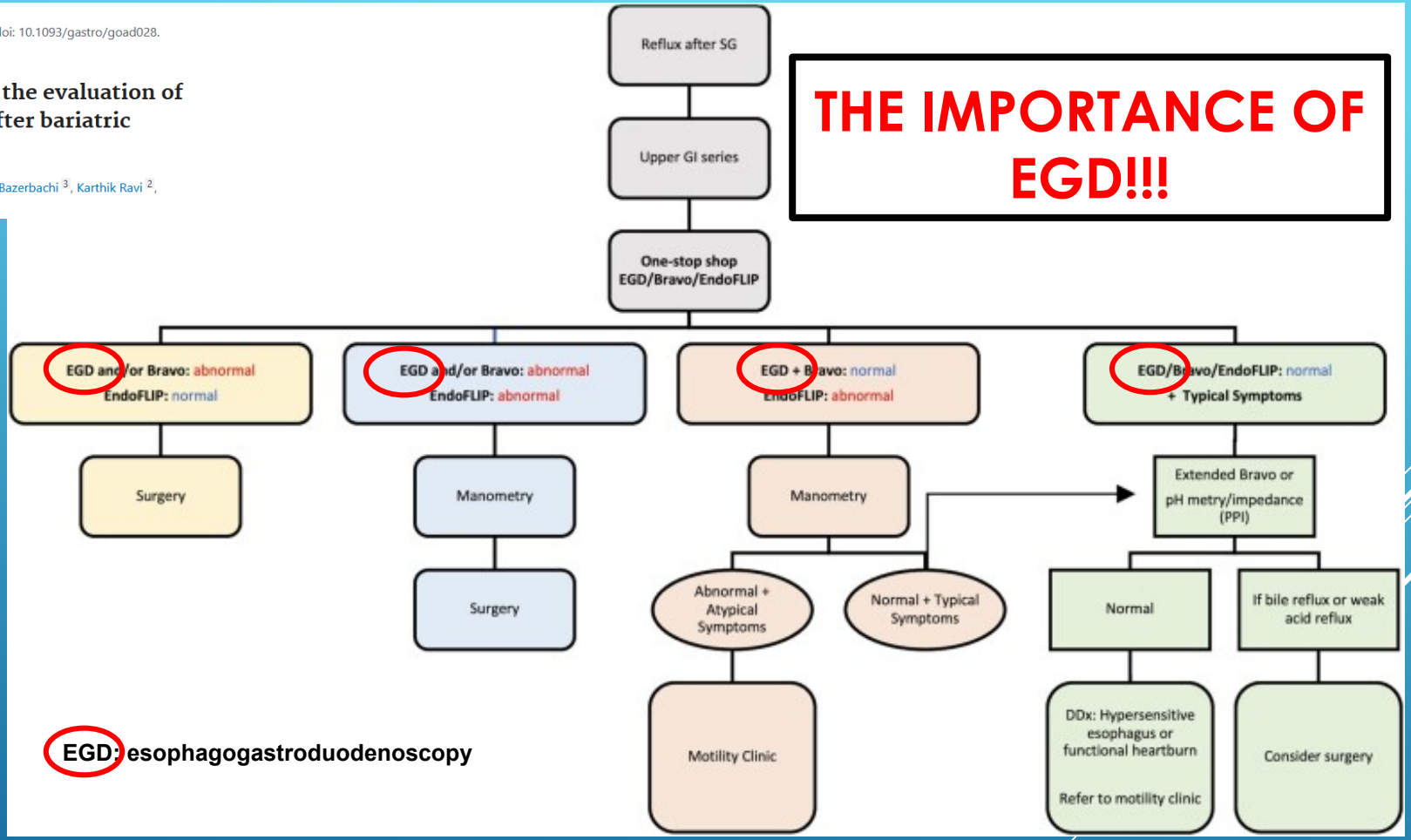


Figure 1. Algorithmic approach for the evaluation and management of GERD after SG. GERD, gastroesophageal reflux disease; SG, sleeve gastrectomy; GI, gastrointestinal; EGD, esophagogastroduodenoscopy; PPI, proton-pump inhibitor; DDx, differential diagnosis.

THE IMPORTANCE OF EGD!!!

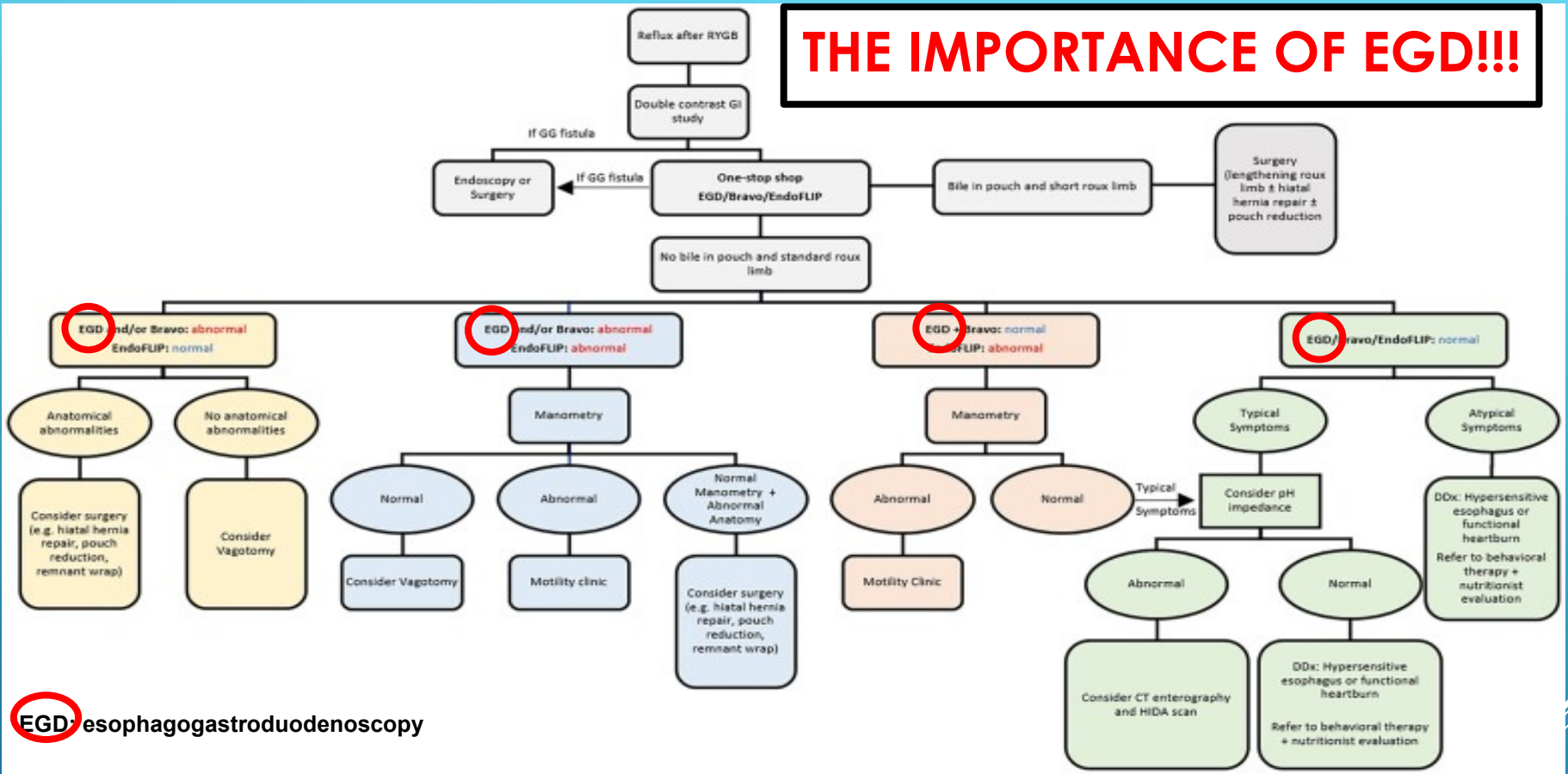


FIGURE 2. ALGORITHMIC APPROACH FOR THE EVALUATION AND MANAGEMENT OF GERD AFTER RYGB. GERD, GASTROESOPHAGEAL REFLUX DISEASE; RYGB, ROUX-EN-Y GASTRIC BYPASS; GI, GASTROINTESTINAL; GG, GASTROGASTRIC; EGD, ESOPHAGOGASTRODUODENOSCOPY; CT, COMPUTED TOMOGRAPHY; HIDA, HEPATOBILIARY IMINODIACETIC ACID; DDX, DIFFERENTIAL DIAGNOSIS.

Review > Gastroenterol Rep (Oxf). 2023 Jun 9:11:goad028. doi: 10.1093/gastro/goad028. eCollection 2023.

Turnkey algorithmic approach for the evaluation of gastroesophageal reflux disease after bariatric surgery

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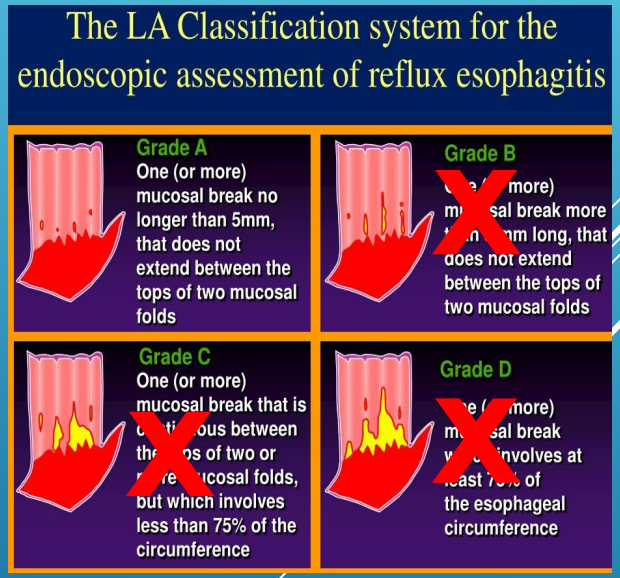
A POSSIBILE INDICATION???

In **OUR EXPERIENCE** (May 2017 to date), 143 cases of laparoscopic Sleeve Gastrectomy & 45 RYGB were performed:

- 1 pt coming from another Institution affected by de-novo GERD following LSG underwent redo-surgery (Roux-en-Y Gastric Bypass);
- 2 pts with de-novo GERD following LSG are currently well-responsive to PPIs;
- No pt treated with RYGB developed de-novo GERD.

SG WAS PERFORMED ONLY IN PTS WITH GRADE A ENDOSCOPIC ASSESSMENT OF REFLUX ESOPHAGITIS RESERVING RYGB FOR ALL OTHER PTS!

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Grazie