When should LSG be revised?
To which construction?

Javier Osorio

When should LSG be revised?
To which construction?

1. INTRODUCTION: shared decisión-making
2. DIAGNOSIS of GERD after LSG
3. WHEN: pros & cons of revisional surgery
4. WHICH: RYGBP or…
5. Take-home messages

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PubMed®

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When should LSG be revised?
To which construction?

When?

What to do when you have gerd after a sleeve gastrectomy?

ChatGPT

I am not a doctor, but I can offer some general information that might be helpful. If you are experiencing symptoms of gastroesophageal reflux disease (GERD) after a sleeve gastrectomy, it's important to consult with a medical professional for personalized advice. However, here are some general steps you might consider:

1. **Consult Your Surgeon or Doctor:** Reach out to the surgeon who performed your sleeve gastrectomy or a gastroenterologist for a thorough evaluation. They can determine the cause of your GERD symptoms and recommend appropriate treatment options.

When?

What to do when you have gerd after a sleeve gastrectomy?

ChatGPT

2 **Lifestyle Modifications:** Making certain changes in your lifestyle can often help manage GERD symptoms. These may include:

- **Diet:** Avoiding trigger foods like caffeine, acidic foods, spicy foods, and fatty foods.
- **Eating Habits:** Eating smaller, more frequent meals and avoiding large meals close to bedtime.
- **Weight Management:** Maintaining a healthy weight can help reduce pressure on the stomach and minimize GERD symptoms.
- **Posture:** Maintaining an upright posture after meals can reduce the likelihood of acid reflux.

When?

What to do when you have gerd after a sleeve gastrectomy?

ChatGPT

3. **Elevating the Head of the Bed:** Elevating the head of your bed by about 6 to 8 inches can help prevent acid from flowing back into the esophagus during sleep.
4. **Avoid Smoking and Alcohol:** Both smoking and alcohol can exacerbate GERD symptoms, so quitting smoking and limiting alcohol intake may be beneficial.
5. **Behavioral Changes:** Stress and anxiety can worsen GERD symptoms. Techniques like relaxation exercises, meditation, and yoga might help manage stress.

When?

What to do when you have gerd after a sleeve gastrectomy?

ChatGPT

6 **Medications:** Your doctor might prescribe medications to help control GERD symptoms. Common medications include proton pump inhibitors (PPIs) that reduce stomach acid production and H2 blockers that decrease acid production.

ChatGPT

7 **Consider Surgery:** In some cases, surgical intervention may be recommended if conservative measures fail to control GERD symptoms. Surgical options might include converting to a Roux-en-Y gastric bypass procedure, which can reduce reflux symptoms by altering the anatomy of the digestive tract.

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When?

ChatGPT

1 **Consult Your Surgeon**

7 **Consider Surgery**

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What are we talking about?

Am J Surg, 2015. Meta-Analysis - Oor JE. *et al*

- 33 studies (**8,092 patients**)
- De novo reflux after sleeve **20% (0-36%)**
- Controversial outcomes in studies included

The exact effect of LSG on the prevalence of GERD remains unanswered

Ann Surg, 2019. Meta-Analysis - *Yeung KTD et al*

- 46 studies (**10,718 patients**)
- De novo reflux after sleeve **23%**
- The long-term prevalence of esophagitis **28%**
- Barrett's esophagus **8%**
- Conversión to RYGB for severe reflux **4%**

Significant prevalence GERD, esophagitis, BE after SG

Obes Surg, 2019. Meta-Analysis - Gu L. *et al*

- 23 studies (**5,000 patients**)
- De novo reflux after sleeve **9.3%**
- Remission GERD rate after sleeve **40.4%**
- Conversión to RYGB for severe reflux **1.82-8.9%**

LRYGB has lower risk of new onset/worse GERD

Br J Surg, 2021. Multicenter Prospective Study - Genco A. *et al*

- Prospective baseline + **10 years follow-up**
- **95 LSG** patients with +10 years follow-up
- **GERD worsened** from 26.3% to **58.9%** p<0.001
- Long term prevalence of **esophagitis** was **74.7**

SG associated with high BE incidence 16.8%

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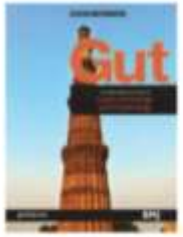
What are we talking about?

Diagnosis GERD based on:

- Clinical assessment, questionnaires, response to PPI → **Sensib. 53.4% Especi. 68.4%**
- Endoscopy findings, biopsy → 55%
- **pH or pH impedance monitoring** → 22,5%
- HRM (manometry) → 10%



According to the International GERD Working Group recommendations - **Lyon Consensus**

	ENDOSCOPY	pH or pH-IMPEDANCE	HRM
CONCLUSIVE EVIDENCE FOR PATHOLOGIC REFLUX	LA grades C&D esophagitis Long segment Barrett's mucosa Peptic esophageal stricture	AET>6%	
BORDERLINE OR INCONCLUSIVE EVIDENCE	LA grades A&B esophagitis	AET 4-6% Reflux episodes 40-80	
ADJUNCTIVE OR SUPPORTIVE EVIDENCE*	Histopathology (score) Electron microscopy (DIS) Low mucosal impedance	Reflux-symptom association Reflux episodes>80 Low MNBI Low PSPWI	Hypotensive EGJ Hiatus hernia Esophageal hypomotility
EVIDENCE AGAINST PATHOLOGIC REFLUX		AET<4% Reflux episodes<40	

Gyawali CP, et al. Gut 2018

IFSO Positioning in GERD, 2020

Bo-quiang Peng et al. Surg for Obes and Relat Dis, 2020

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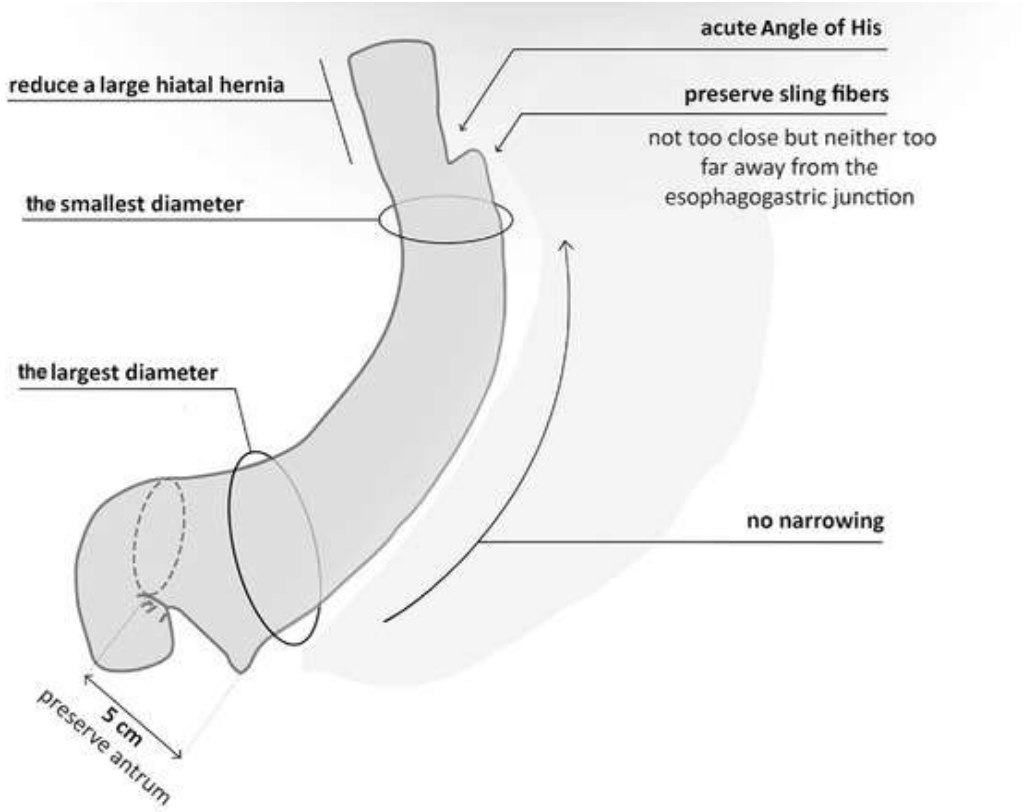

Felinska E, et al. Do we understand the pathophysiology of GERD after sleeve gastrectomy? Ann N Y Acad Sci. 2020, 482(1):26-35.

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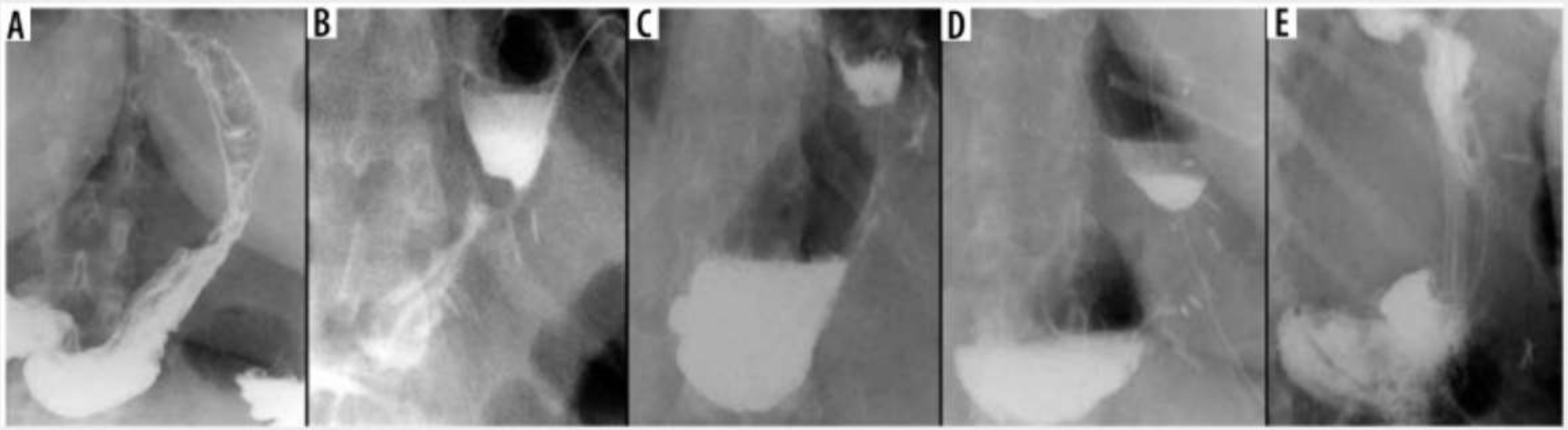
What are we talking about?

Shape variants of gastric remnants after laparoscopic sleeve gastrectomy (upper gastrointestinal study): **A**) tubular, **B**) superior pouch, **C**) inferior pouch, **D**) superior-inferior pouch, **E**) pseudodiverticular shape



Werquin C, et al. Early imaging features after sleeve gastrectomy. J Radiol 2008; 89: 1721-1728

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When revisional surgery?

PROS

- Control GERD symtoms
- Avoid dysplasia-cancer progression

CONS

- Short-term risks
- Long-term risks

PRO

Control GERD symtoms

RYGBP to treat GERD after LSG	n	Complete resolution	Incomplete resolution	No improvement
Langer 2010	3	3	-	-
Abdemur 2012	9	7	2	-
Van Rutte 2012	5	3	2	-
Gautier 2013	6	6	-	-
Hendricks 2016	4	3	1	-
Ianelli 2016	11	11	-	-
Parmar 2017	10	8	2	-
Yorke 2017	9	6	-	3
Amiki 2020	9	6	3	-
Lim CH 2020	14	7	6	1
Carandina 2020	80	67	-	23
Huynh 2021	41	29	12	
Curell 2021	35	26	7	2
Strauss 2023	97	20	77	-
HUB 2023 [unpublished data]	25	20	4	1
TOTAL	358	212	116	30
PERCENTAGE		**60%**	**32%**	**8%**

After gastric banding OR 3.69

Delayed onset GERD (>3m)

Surgical technique

1. INTRODUCTION: shared decisión-making
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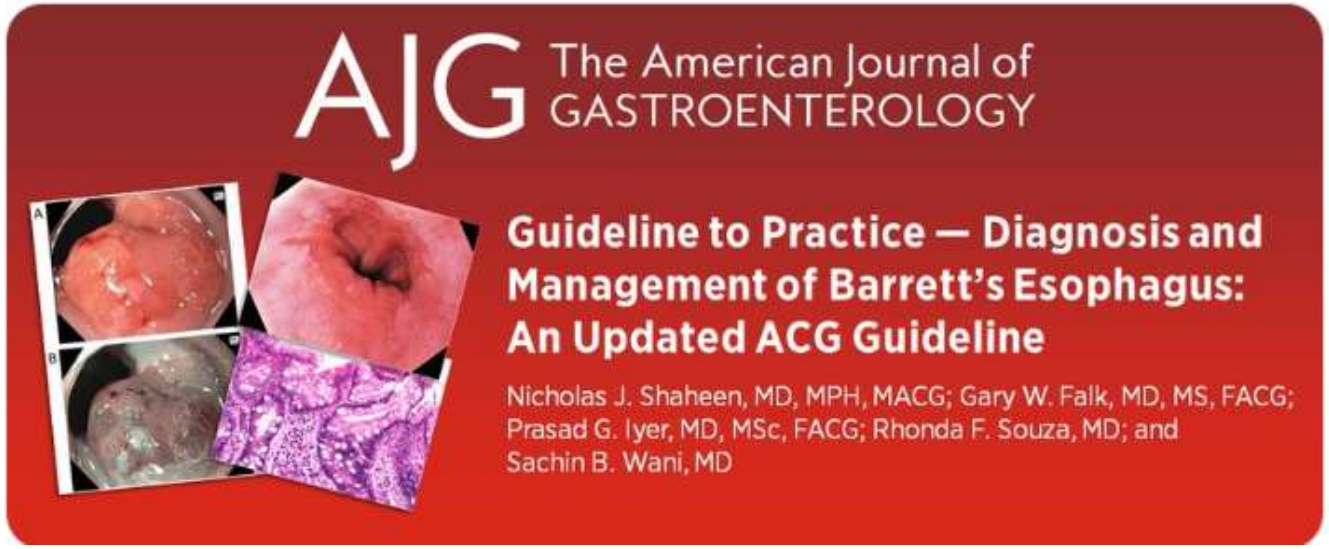
PRO

Diminsh risk of progression to Barrett to displasia to cancer



We suggest **against the use of antireflux surgery** as an antineoplastic measure in patients with Barrett

Shaheen NJ, et al. Diagnosis and Management of Barrett's Esophagus: An Updated ACG Guideline. Am J Gastroenterol. 2022;117(4):559-587.

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CON

Short-term complications

	P-RYGB $n=84,543$	SG-RYGB $n=13,432$	p value
Operative time, minutes			
mean ± sd	125.2 ± 57.0	145.4 ± 67.9	< 0.001
Robotic assisted	18,045 (21.3)	3132 (23.3)	< 0.001
Length of stay, days			
Median (interquartile range)	1 (1)	1 (1)	< 0.001
Anastomotic leak	309 (0.4)	73 (0.5)	0.002
Postoperative bleeding	1331 (1.6)	268 (2.0)	< 0.001
Reoperation	1584 (1.9)	405 (3.0)	< 0.001
Non-operative intervention	1252 (1.5)	298 (2.2)	< 0.001
Readmission	4052 (4.8)	985 (7.3)	< 0.001
Cardiac events	117 (0.1)	16 (0.1)	0.573
Pneumonia	311 (0.4)	74 (0.6)	0.002
Unplanned intubation	134 (0.2)	20 (0.2)	0.443
Acute kidney injury	115 (0.1)	10 (0.1)	0.063
Venous thromboembolism	297 (0.4)	40 (0.3)	0.325
Deep surgical site infection	453 (0.5)	130 (1.0)	< 0.001
Wound disruption	64 (0.1)	16 (0.1)	0.120
Sepsis	120 (0.1)	39 (0.3)	< 0.001
Cerebrovascular accident	10 (0.01)	3 (0.02)	0.326
Serious complications	4240 (5.0)	964 (7.2)	< 0.001
Death	85 (0.1)	17 (0.1)	0.385

Dang JT, et al. Conversion of Sleeve Gastrectomy to Roux-en-Y Gastric Bypass: Indications, Prevalence, and Safety. Obes Surg. 2023;33 (5):1486-1493.

HUB 2023 [unpublished data]	P-RYGBP n = 446	SG-RYGBP n = 25	p
Serious complications	3.3%	4%	n.s
Death	0	0	n.s

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CON

Short-term complications

Signifcant risk factors for mortality on multivariable logistic regression

Risk factor	Adjusted odds ratio*	95% confidence interval	*p* value
SG-RYGB vs. P-RYGB	1.34	0.76–2.35	0.316
Partially dependent functional status	4.70	2.04–10.8	<0.001
Chronic kidney disease	3.05	1.15–8.11	0.025
Previous percutaneous coronary intervention	2.50	1.17–5.36	0.018
Gastroesophageal reflux disease	1.52	1.00–2.32	0.049
Longer operative time (per hour)	1.22	1.04–1.43	0.013
Older age (per year)	1.06	1.04–1.09	<0.001
Female sex	0.53	0.34–0.84	0.007

*Adjusted for diabetes, American Society of Anesthesiologists physical status classification, hypertension, hyperlipidemia, chronic obstructive pulmonary disease, previous venous thromboembolism, therapeutic anticoagulation, obstructive sleep apnea, previous myocardial infarction, and previous cardiac surgery

Dang JT, et al. Conversion of Sleeve Gastrectomy to Roux-en-Y Gastric Bypass: Indications, Prevalence, and Safety. Obes Surg. 2023;33 (5):1486-1493.

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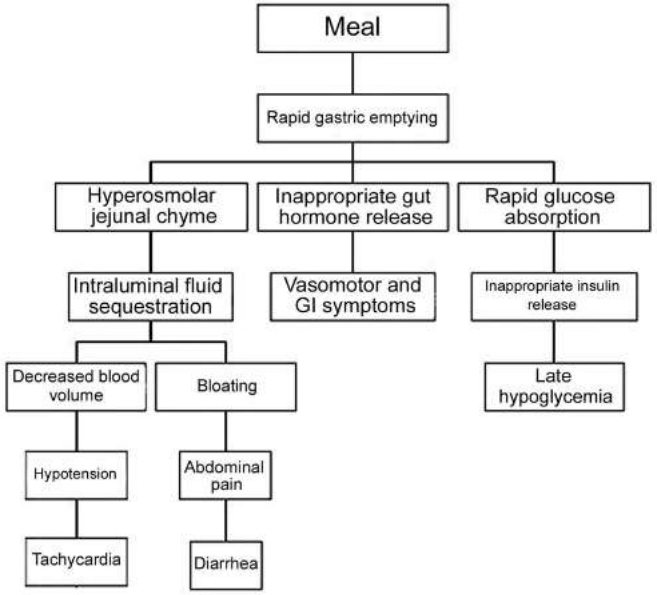
CON

Long-term complications

Internal hernia

Iannelli A, et al.
Internal hernia after laparoscopic Roux-en-Y gastric bypass for morbid obesity.
Obes Surg. 2006;16(10):1265-71.

Dumping



Poljo A, et al.
Incidence of Dumping Syndrome after Sleeve Gastrectomy, Roux-en-Y Gastric Bypass and One-Anastomosis Gastric Bypass.
J Metab Bariatr Surg. 2021;10(1):23-31.

Marginal ulcer

Salame M, et al.
Marginal Ulcers after Roux-en-Y Gastric Bypass: Etiology, Diagnosis, and Management. J Clin Med. 2023 Jun 28;12(13):4336.

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CON

Risk of marginal ulcer

Surgical Endoscopy (2023) 37:3974–3981
https://doi.org/10.1007/s00464-022-09430-4

2022 SAGES ORAL

Increased incidence of marginal ulceration following conversion of sleeve gastrectomy to Roux-en-Y gastric bypass: a multi-institutional experience

Brigitte Anderson[1] · Tingting Zhan[2] · Luke Swaszek[3] · Caroline Sanicola[4] · Neil King[3] · Aurora Pryor[4] · Konstantinos Spaniolas[4] · Renee Tholey[1] · Francesco Palazzo[1] · Alec Beekley[1] · Talar Tatarian[1,5]

Incidence of MU was significantly higher for patients undergoing S-RYGB (n = 9 [13.6%]), compared to P-RYGB (n = 34 [5.8%]) and B-RYGB (n = 3 [3.1%]) (p = 0.023).

Median time (months) to MU was significantly shorter for patients who underwent S-RYGB (5 ± 6) compared to P-RYGB or B-RYGB (19 ± 37.5) (p = 0.035).

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CON

Risk of marginal ulcer

Surg Endosc
DOI 10.1007/s00464-015-4432-2

Importance of pouch size in laparoscopic Roux-en-Y gastric bypass: a cohort study of 14,168 patients

David Edholm[1] · Johan Ottosson[2] · Magnus Sundbom[1]

Surg Endosc

Table 2 Presence of marginal ulcer at 6 weeks or 1 year, correlated with gender, age, preoperative BMI, diabetes and stapler length by multivariate logistic regression

	After 6 weeks		After 1 year	
	p	Odds ratio with (95 % confidence interval)	*p*	Odds ratio with (95 % confidence interval)
Male gender	.18	.67 (.37–1.20)	.96	.98 (.95–1.02)
Age at surgery (years)	.34	.99 (.96–1.01)	.53	1.01 (.99–1.02)
Preoperative BMI (kg/m^2)	.65	.99 (.95–1.03)	.31	.98 (.95–1.02)
Diabetes	.29	1.39 (.74–2.59)	.27	1.30 (.82–2.05)
Length of staplers used for pouch (cm)	<.001	1.10 (1.03–1.18)	<.001	1.14 (1.09–1.20)

BMI Body mass index

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CON

Risk of marginal ulcer

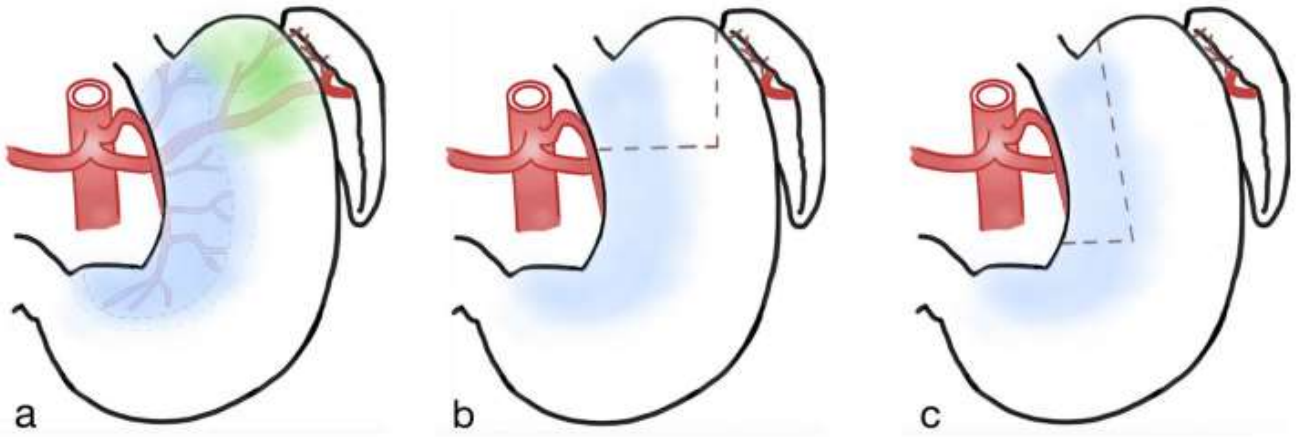
Surgical Endoscopy (2022) 36:3011–3018
https://doi.org/10.1007/s00464-021-08597-6

Check for updates

Linear or circular: Anastomotic ulcer after gastric bypass surgery

Aline Schäfer[1] · Philipp Gehwolf[1] · Katrin Kienzl-Wagner[1] · Fergül Cakar-Beck[1] · Heinz Wykypiel[1]

Received: 18 March 2021 / Accepted: 6 June 2021 / Published online: 18 June 2021



To which?

If I need a surgery to treat GERD after sleeve? Which is the best option?

ChatGPT

1 **Fundoplication:** This is a common surgical procedure used to treat GERD. It involves wrapping the top of the stomach (fundus) around the lower esophagus to strengthen the lower esophageal sphincter and prevent stomach acid from flowing back into the esophagus. There are different types of fundoplication procedures, including Nissen fundoplication, Toupet fundoplication, and Dor fundoplication.

2 **LINX Device:** The LINX device is a ring of magnetic beads that is surgically placed around the lower esophagus. The magnetic attraction between the beads helps to keep the lower esophageal sphincter closed, preventing reflux while allowing food to pass through.

3 **Conversion to Roux-en-Y Gastric Bypass:** Similar to gastric bypass revision, converting a sleeve gastrectomy to a Roux-en-Y gastric bypass can also be considered. This procedure involves creating a small stomach pouch and rerouting the small intestine to bypass a portion of the stomach and the lower esophagus.

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J Gastrointest Surg
DOI 10.1007/s11605-015-2887-e

ORIGINAL ARTICLE

Gastroesophageal Reflux Management with the LINX® System for Gastroesophageal Reflux Disease Following Laparoscopic Sleeve Gastrectomy

Kenneth Desart[1] · Georgios Rosaidis[1] · Michael Michel[1] · Tamara Lax[1] · Kfir Ben-David[2]

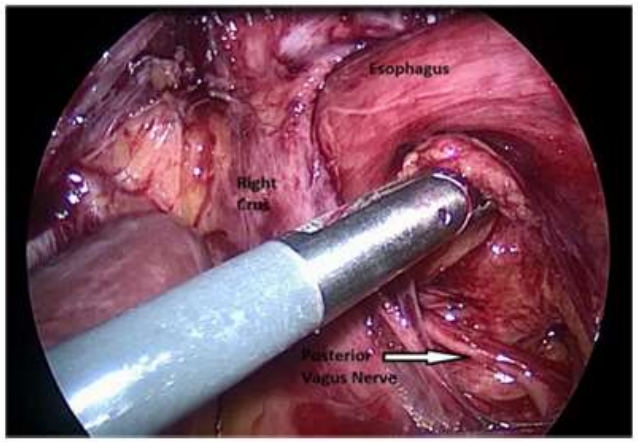

Fig. 1 Dissection of posterior vagus nerve

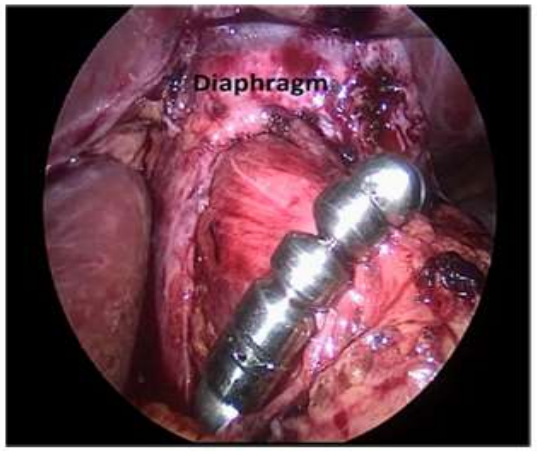

Fig. 2 Placementof LINX® device

Surgical Endoscopy (2022) 36:8255–8260
https://doi.org/10.1007/s00464-022-09261-3

Laparoscopic magnetic sphincter augmentation device placement for patients with medically-refractory gastroesophageal reflux after sleeve gastrectomy

Samik H. Patel[1] · Barry Smith[1] · Robert Polak[1] · Morgan Pomeranz[1] · Punam V. Patel[1] · Richard Englehardt[1]

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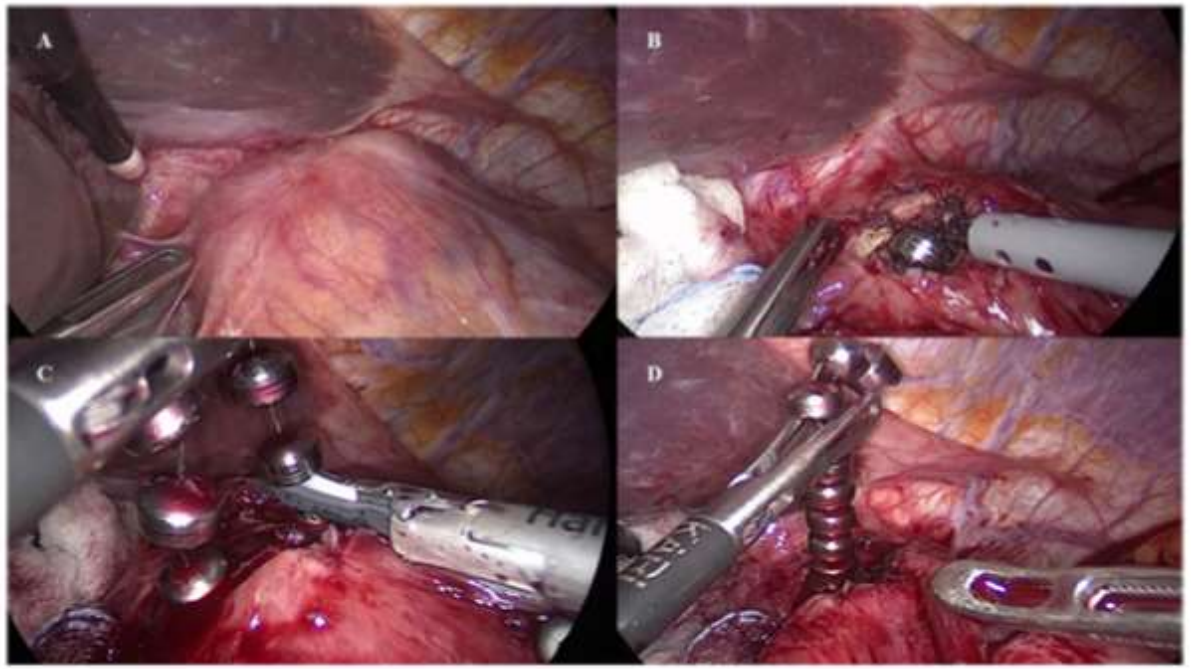
Langenbeck's Archives of Surgery (2021) 406:2545–2551
https://doi.org/10.1007/s00423-021-02294-7

HOW-I-DO-IT ARTICLES

Check for updates

Magnetic sphincter augmentation device removal: surgical technique and results at medium-term follow-up

Davide Bona[1] · Greta Saino[1] · Emanuele Mini[1] · Francesca Lombardo[1] · Valerio Panizzo[1] · Marta Cavalli[2] · Gianluca Bonitta[1] · Giampiero Campanelli[2] · Alberto Aiolfi[1]



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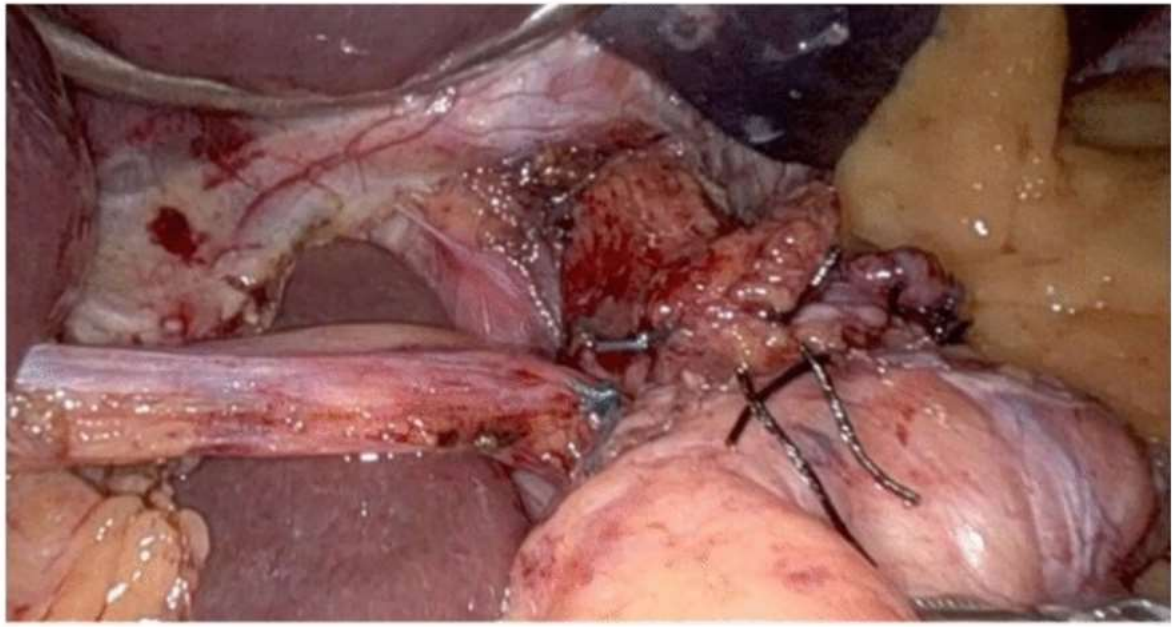
Surgical Endoscopy
https://doi.org/10.1007/s00464-023-10239-y

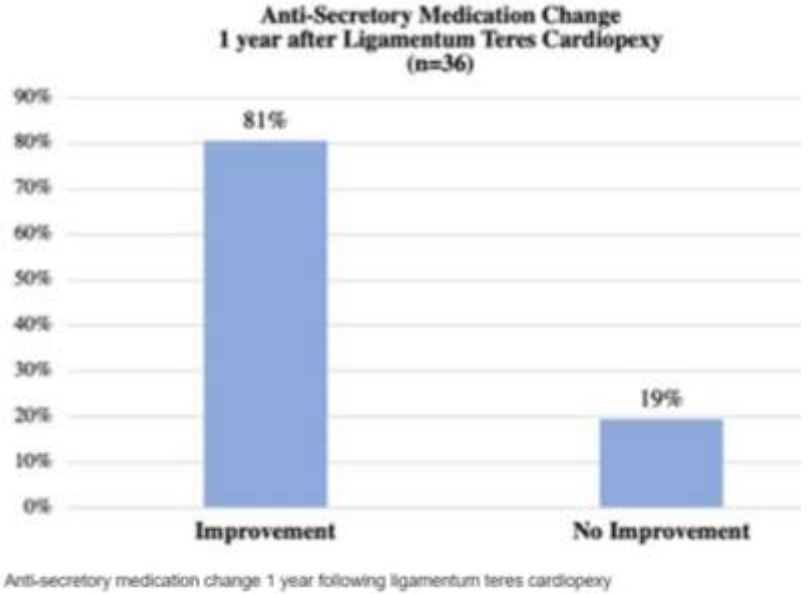
2023 SAGES ORAL

Ligamentum teres cardiopexy for post vertical sleeve gastrectomy gastroesophageal reflux

Emily E. Mackey[1] · Fiona J. Dore[1] · John F. Kelly[1] · Allison S. Crawford[1] · Philip Cohen[1] · Donald Czerniach[1] · Richard Perugini[1] · John J. Kelly[1] · Nicole B. Cherng[1,2]



Intraoperative image of complete ligamentum teres cardiopexy



Anti-secretory medication change 1 year following ligamentum teres cardiopexy

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Obesity Surgery (2020) 30:3695–3705
https://doi.org/10.1007/s11695-020-04749-0

ORIGINAL CONTRIBUTIONS

Gastroesophageal Reflux and Laparoscopic Sleeve Gastrectomy: Results of the First International Consensus Conference

Ahmad Assalia[1] · Michel Gagner[2,3] · Marius Nedelcu[4,5] · Almino C. Ramos[6] · David Nocca[7]

For sleeve patients with EWL > 50% after 2 years and GERD symptoms with poor quality of life under PPI treatment, what is your first surgical option?

- LINX procedure: 2.2%
- LSG with an anti- reflux procedure (TERES): 4.4%
- *RYGB: 75.6%*
- OAGB: 6.6%
- Other: 11.1%

For sleeve patients with EWL < 25% (current BMI40) and GERD symptoms with poor quality of life under PPI treatment and a CT volumetry < 250 cc, what is your first surgical option?

- *RYGB: 84.4%*
- SAGB: 6.7%
- Other: 8.8%

Take-home messages
Revisional surgery for GERD after sleeve
When?

- Poor QOL under medical treatment
- Bad evolution of Barrett under medical treatment
- Diagnosis: Lyon consensus (gastroscopy + ph-metry) + barium swallow
- Shared decision making – taylored counseling

PRO RY-GBP
> 90% symtoms improvement

MORE improvement	- Gastric stenosis, superior pouch - Early onset + typical symptoms
LESS short-term risk	- Independent, < 60 y, females

CONS RY-GBP
Surgical early and late risks

LESS improvement	- Gastric band - Late onset + atypical symtoms
MORE short-term risk	- Dependent, > 60 y, males - Cronic renal, ischemic cardiac disease
MORE marginal ulcer	- Smokers - Diabetes - NSAID treatment - Inmunosupresive treatment

Take-home messages
Revisional surgery for GERD after sleeve

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- Poor QOL under medical treatment
- Bad evolution of Barrett under medical treatment
- Diagnosis: Lyon consensus (gastroscopy + ph-metry) + barium swallow
- Shared decision making – taylored counseling

To which?

RY-GBP

- Stomach reduction
- Small pouch
- Lineal anastomosis