

A blue watercolor splash on a white background, located in the top left corner of the slide.

# UCI Health

## Gastroesophageal Reflux Disease after Vertical Sleeve Gastrectomy

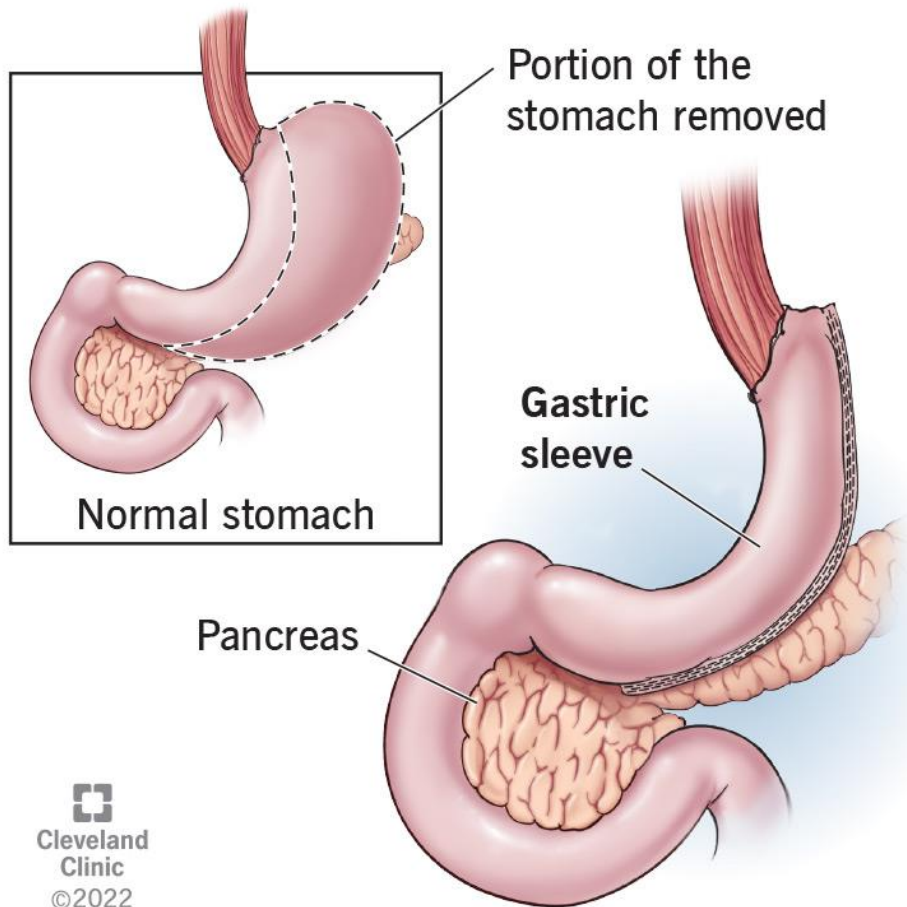
Annie Wang, MD

Assistant Professor of Clinical Surgery

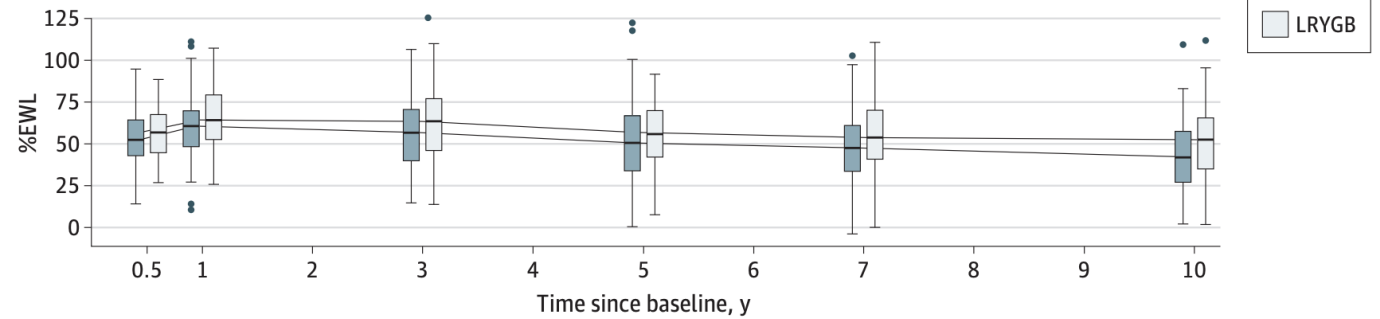
Division of Minimally Invasive Gastrointestinal Surgery

# Vertical Sleeve Gastrectomy

## Gastric Sleeve Surgery



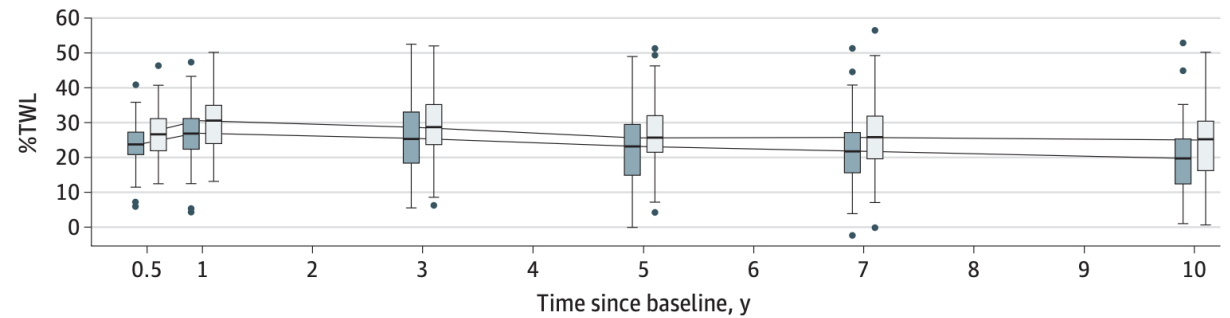
**A** %EWL after LSG and LRYGB from baseline to 10 y



No. at risk

|                |     |     |     |    |    |    |
|----------------|-----|-----|-----|----|----|----|
| LRYGB patients | 111 | 108 | 100 | 95 | 91 | 95 |
| LSG patients   | 119 | 111 | 108 | 98 | 91 | 98 |

**B** %TWL after LSG and LRYGB from baseline to 10 y



No. at risk

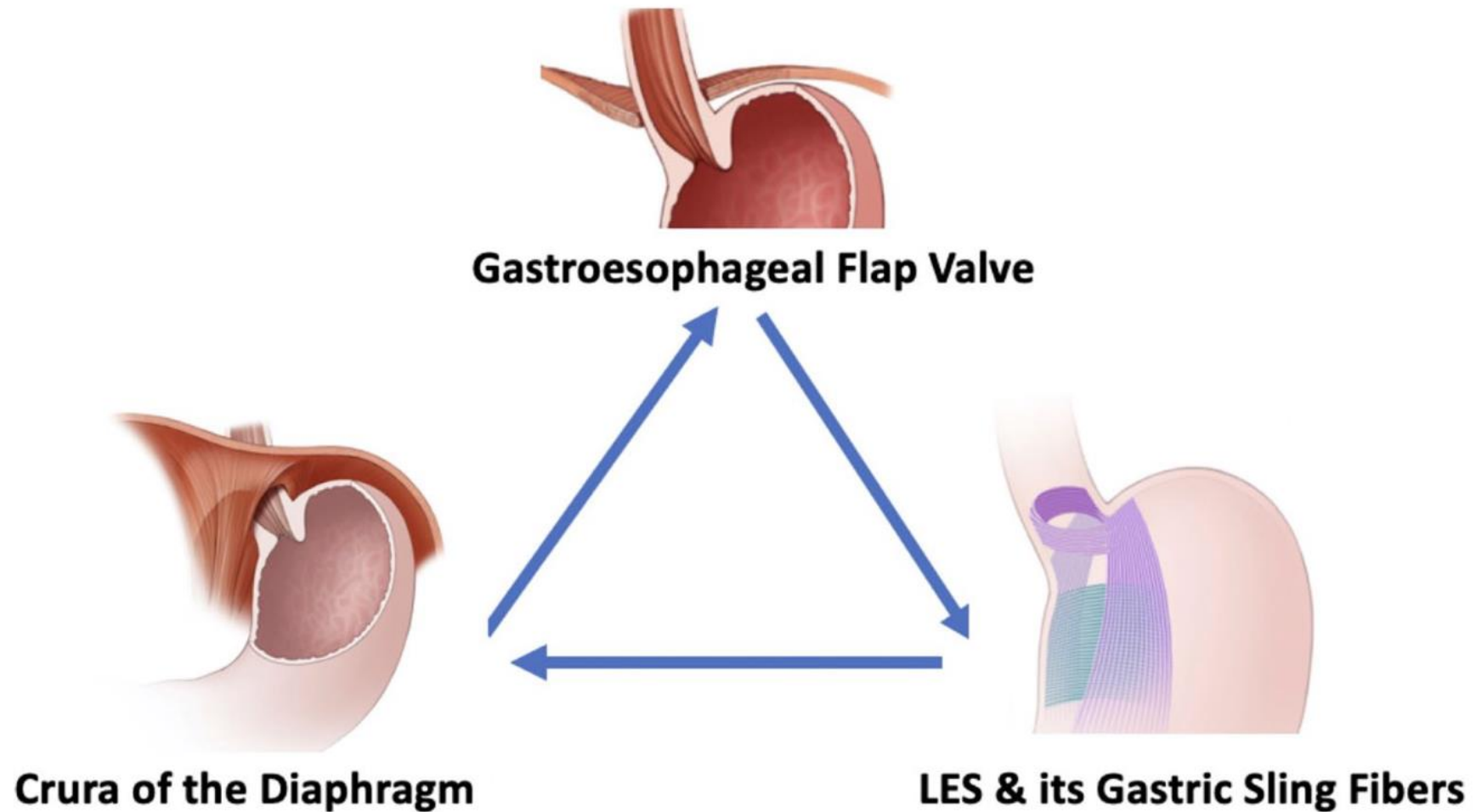
|                |     |     |     |    |    |    |
|----------------|-----|-----|-----|----|----|----|
| LRYGB patients | 111 | 108 | 100 | 95 | 91 | 95 |
| LSG patients   | 119 | 111 | 108 | 98 | 91 | 98 |

# GERD after Vertical Sleeve Gastrectomy

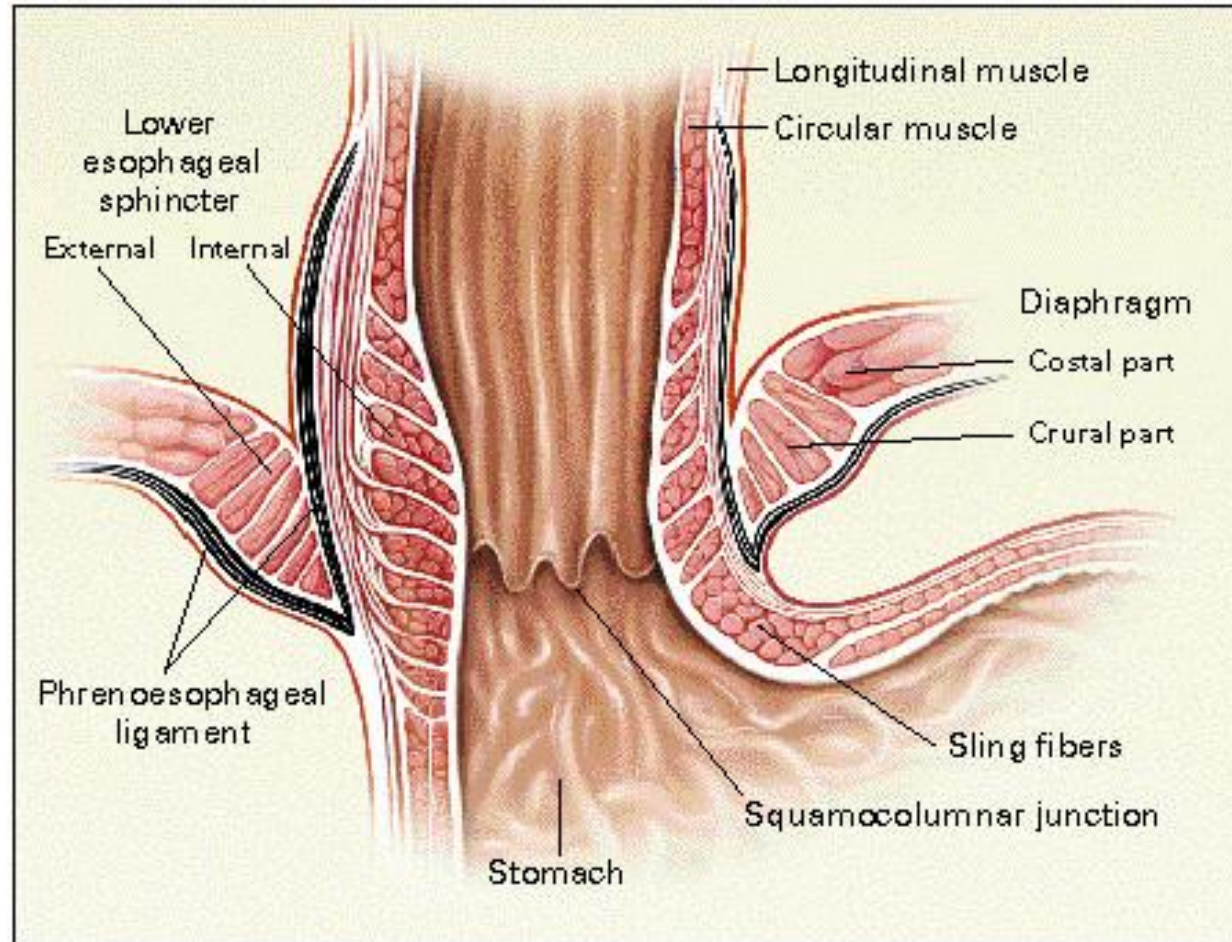
|  | No./total No. (%) |                | P value            |
|--|-------------------|----------------|--------------------|
|  | LSG (n = 91)      | LRYGB (n = 85) |                    |
| All patients who underwent endoscopy       | 91/121 (75.2)     | 85/119 (71.4)  |                    |
| PPI intake preoperatively                  | 11/89 (12)        | 5/81 (6)       | .20 <sup>a</sup>   |
| PPI intake at 10 y                         | 58/90 (64)        | 30/84 (36)     | <.001 <sup>a</sup> |
| GERD symptoms                              |                   |                |                    |
| No symptoms preoperatively or at any point | 18/90 (20)        | 39/85 (46)     |                    |
| Symptoms similar to preoperatively         | 16/90 (18)        | 6/85 (7)       | <.001 <sup>a</sup> |
| Symptoms alleviated postoperatively        | 12/90 (13)        | 32/85 (38)     |                    |
| Symptoms worsened postoperatively          | 44/90 (49)        | 8/85 (9)       |                    |
| GERD-HRQL total score, median (range)      | 10.5 (0.0-47.0)   | 0.0 (0.0-47.0) | <.001 <sup>b</sup> |
| Hiatal hernia <sup>c</sup>                 | 57/91 (63)        | NA             | NA                 |
| All patients with esophagitis              | 28/91 (31)        | 6/85 (7)       | <.001 <sup>d</sup> |

# Pathophysiology

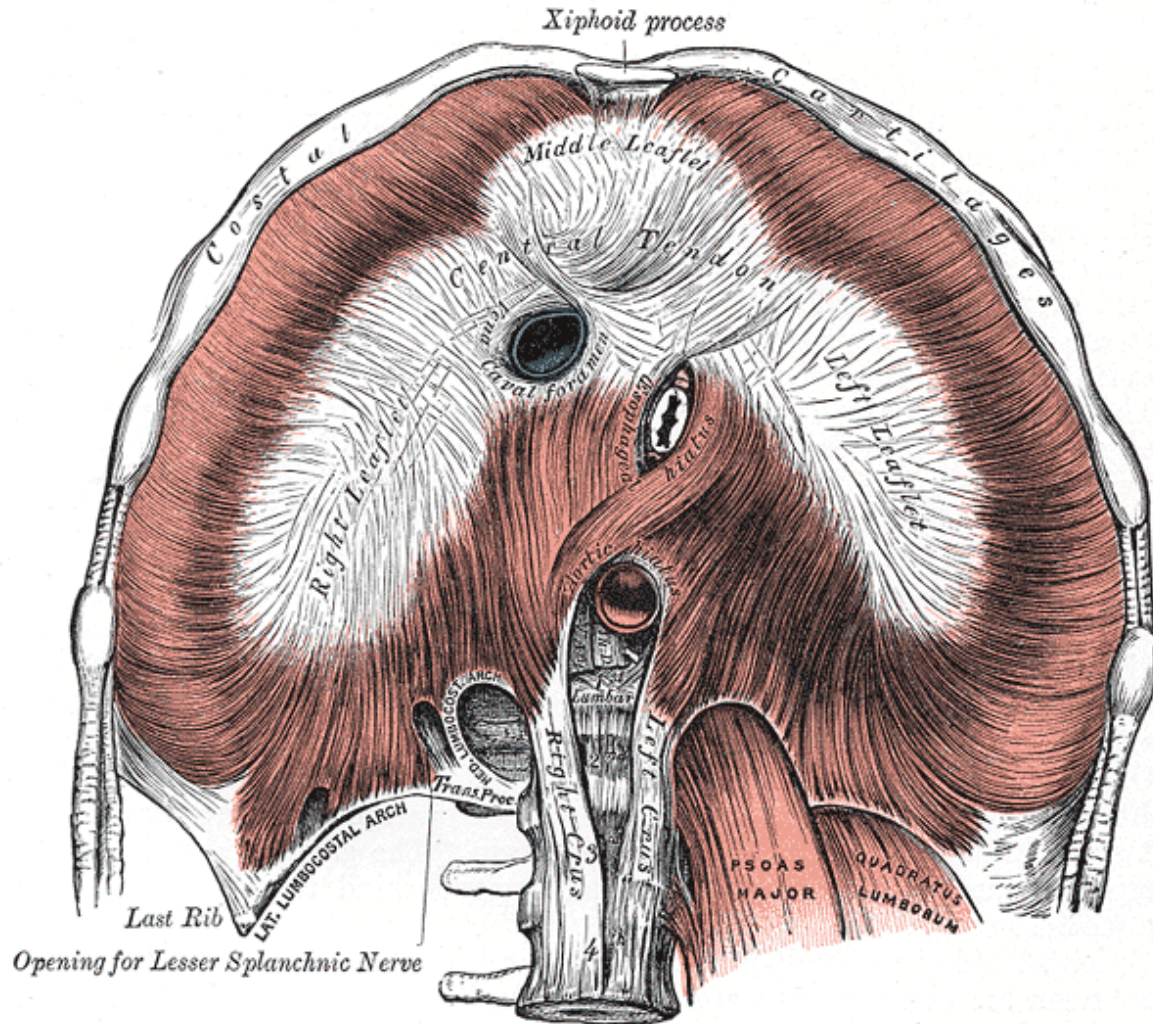
# The Anti-Reflux Barrier



# The Gastroesophageal Junction



# The Esophageal Hiatus

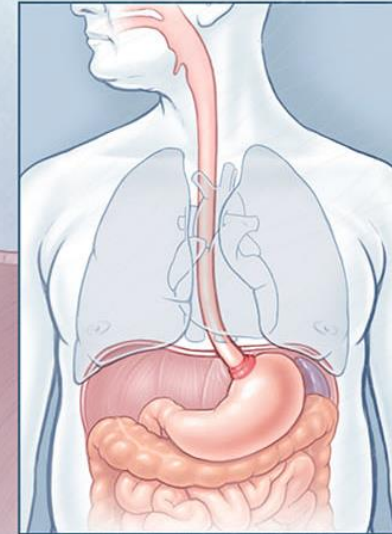


Gray, 1918

## Paraesophageal or hiatal hernia

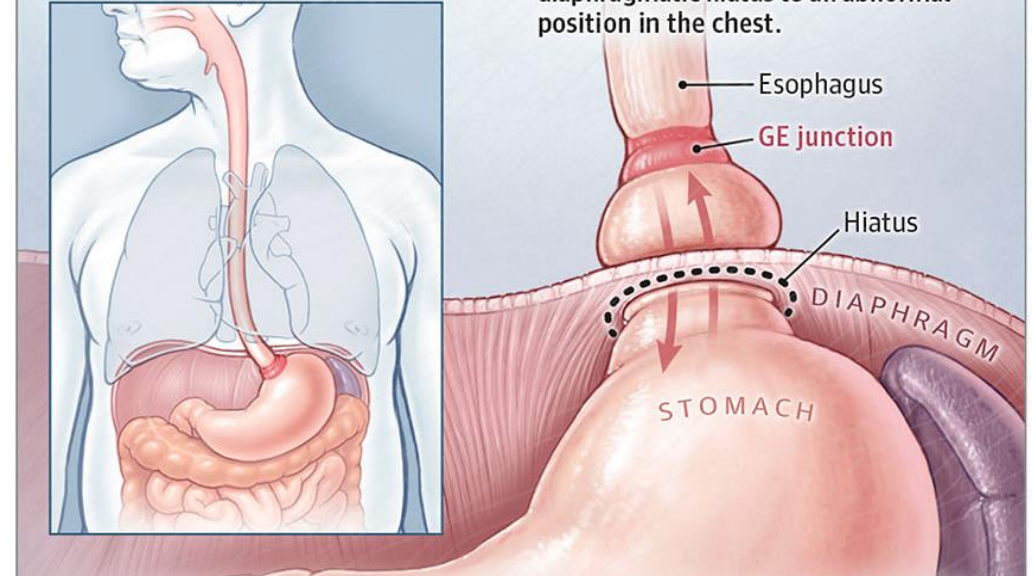
The junction between the esophagus and the stomach (the gastroesophageal or GE junction) or other organs move from the abdomen into the chest.

Normal location of the esophagus, with the **GE junction** and stomach in the abdominal cavity

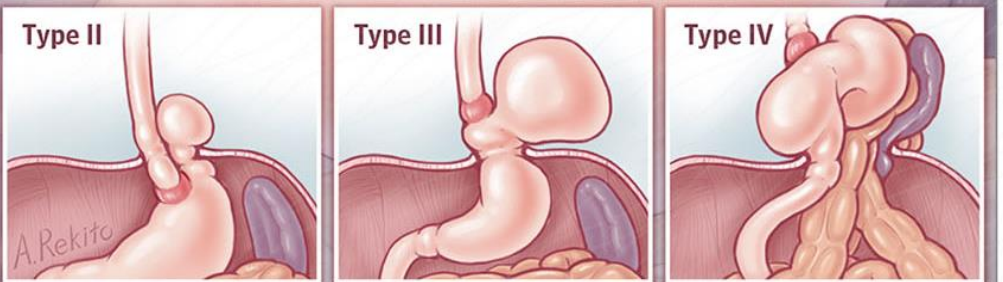


## Type I hiatal hernia (sliding hernia)

The **GE junction** slides through the diaphragmatic hiatus to an abnormal position in the chest.



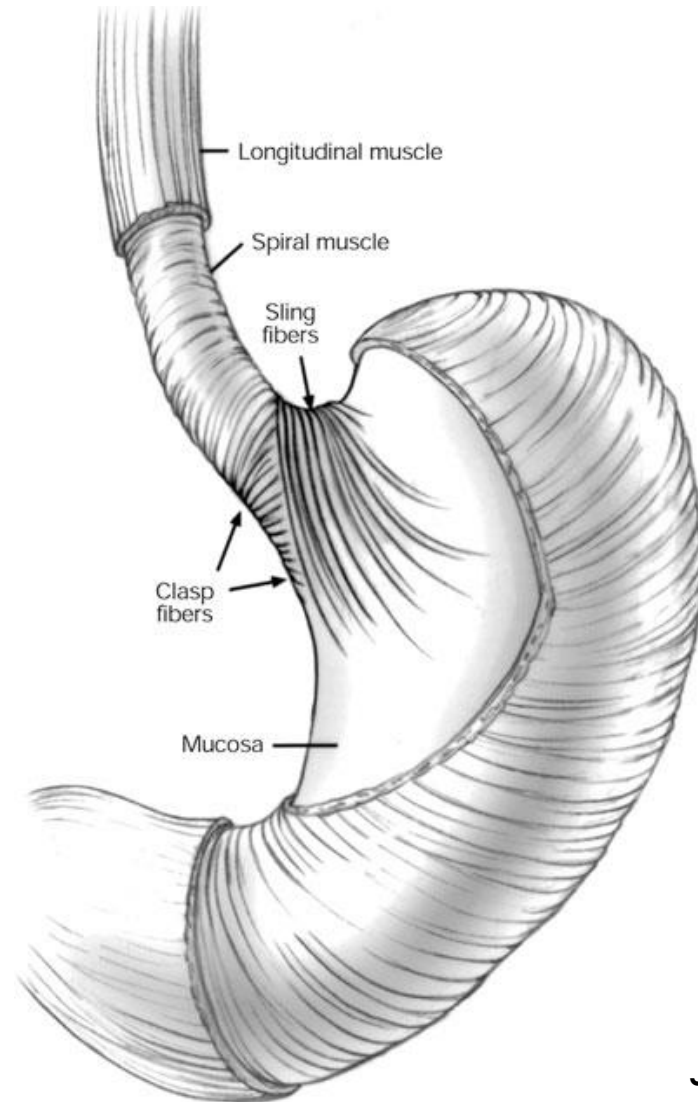
Less common types of paraesophageal hernias are classified based on the extent of the stomach entering the chest or having other organs herniate into the chest.



JAMA. 2019;322(21):2146. doi:10.1001/jama.2019.17395. © American Medical Association

Baiu and Lau, 2019

# Intrinsic Muscles of the Stomach



# Sleeve Construction

Table 4

Univariate and multivariate analysis of variables associated with regular PPI use at the second year after sleeve gastrectomy

| Characteristics                            | N (%)         | Regular PPI use     | P value | Regular PPI use         | P value         |
|--|---------------|---------------------|---------|-------------------------|-----------------|
|  |               | Univariate analysis |         | Multivariate analysis   |                 |
|  |               | OR                  |         | OR                      |                 |
| Bougie size 30–32 (compared to 35–36)      | 906 (11.9%)   | 1.24 (1.03–1.5)     | .026    | <b>1.28 (1–1.63)</b>    | <b>.047</b>     |
| Pyloric distance 1–4 cm (compared to 5 cm) | 2,998 (39.3%) | .95 (.8–1.11)       | .54     | .95 (.8–1.12)           | .56             |
| Pyloric distance 6–8 cm (compared to 5 cm) | 445 (5.8%)    | 1.46 (1.1–1.9)      | .006    | <b>1.45 (1.09–1.93)</b> | <b>.011</b>     |
| Sex (female compared to male)              | 5,883 (77.1%) | 1.22 (1.4–1.43)     | .016    | <b>1.56 (1.27–1.9)</b>  | <b>&lt;.001</b> |
| Age at operation (yr)                      |               | 1.03 (1.02–1.04)    | <.001   | <b>1.03 (1.02–1.04)</b> | <b>&lt;.001</b> |
| Preoperative BMI                           |               | 1.02 (1.01–1.03)    | .002    | 1 (.99–1.02)            | .52             |
| Hypertension                               | 1,593 (20.9%) | 1.52 (1.31–1.76)    | <.001   | 1.1 (.9–1.4)            | .23             |
| Sleep apnea                                | 677 (8.9%)    | 1.1 (.89–1.4)       | .38     |                         |                 |
| Diabetes                                   | 750 (9.8%)    | 1.42 (1.16–1.73)    | <.001   | 1.08 (.83–1.4)          | .56             |
| Dyslipidaemia                              | 524 (6.9%)    | 1.48 (1.18–1.86)    | <.001   | .98 (.7–1.3)            | .9              |
| Total weight loss at 1 yr                  |               | 1 (.99–1.01)        | .86     |                         |                 |

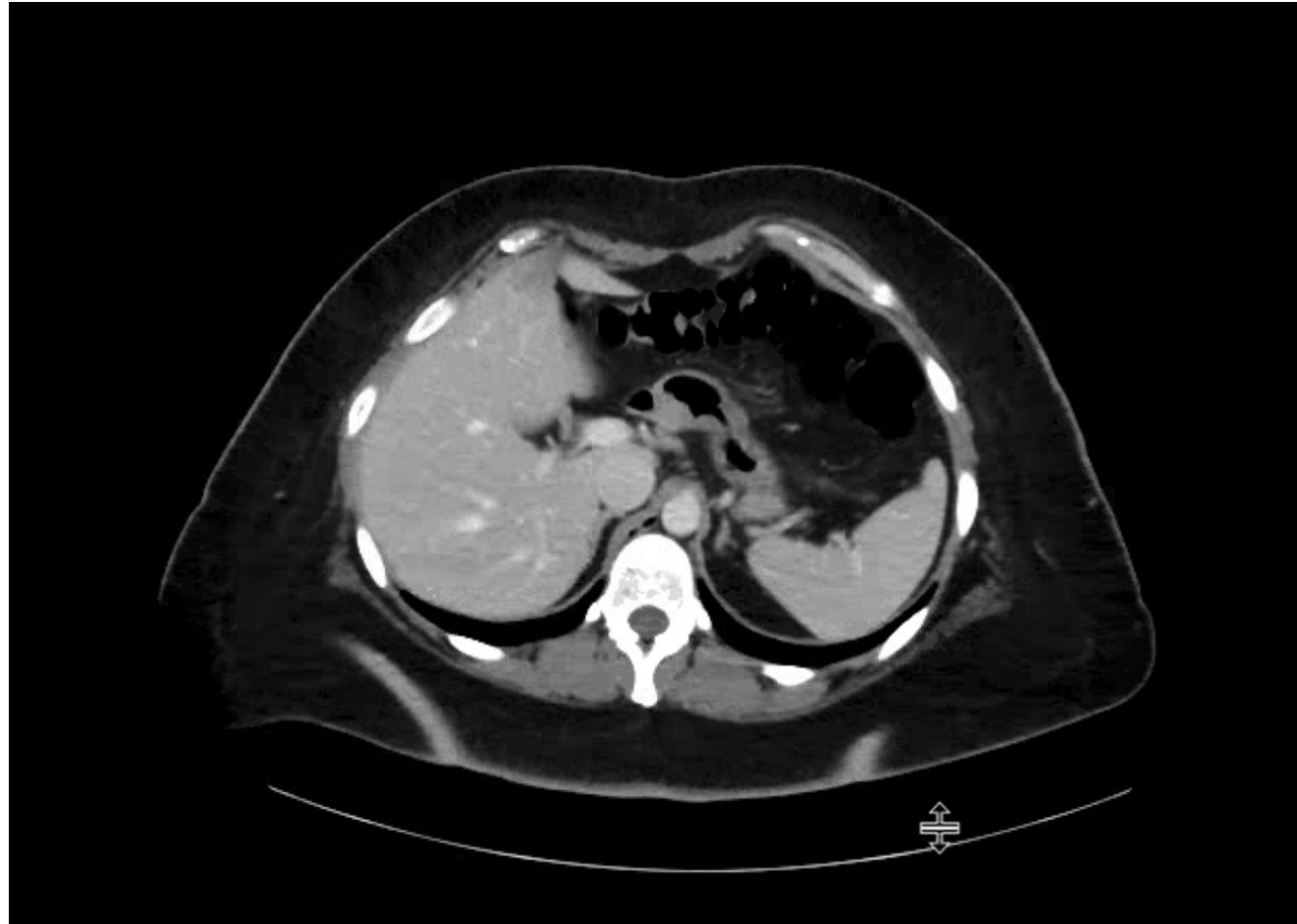
BMI = body mass index; PPI = proton pump inhibitor; OR = odds ratio.

The bolded values indicate those that are statistically significant.

# Distal Sleeve Narrowing with Proximal Sleeve Dilation



# Asymmetric Sleeve

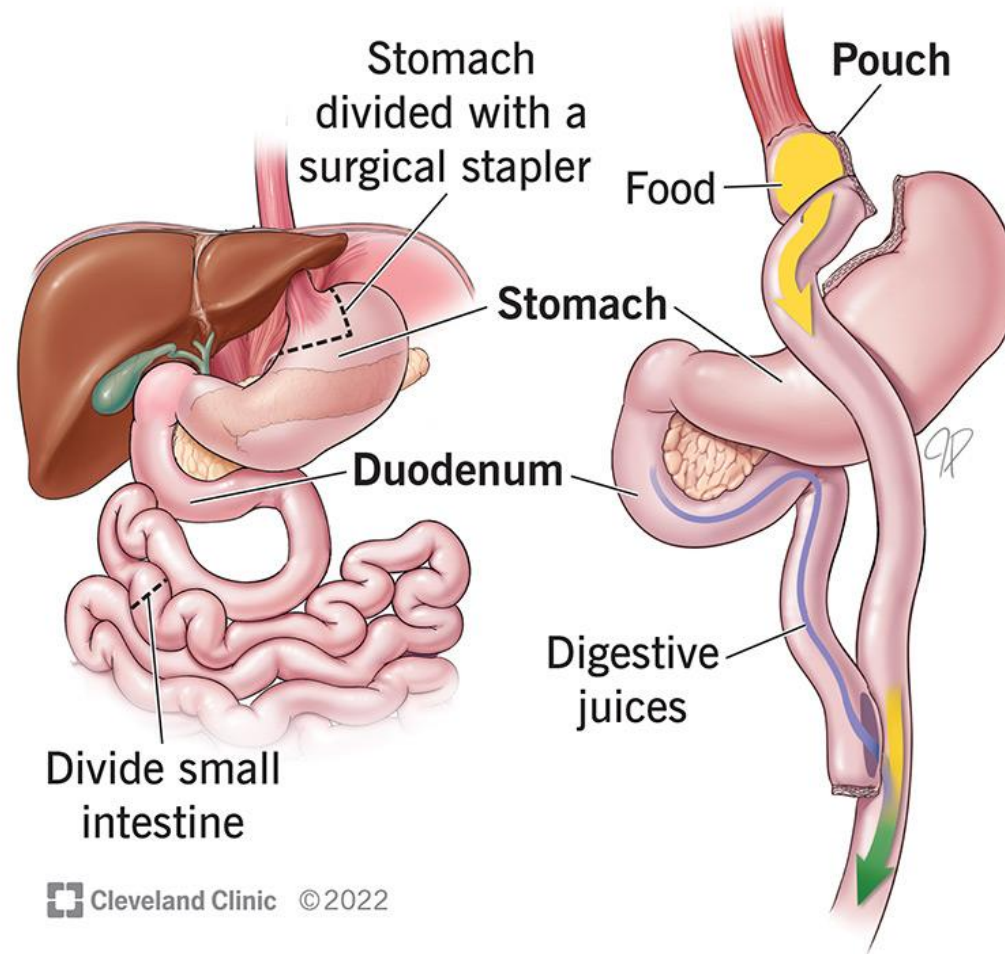


Treatment

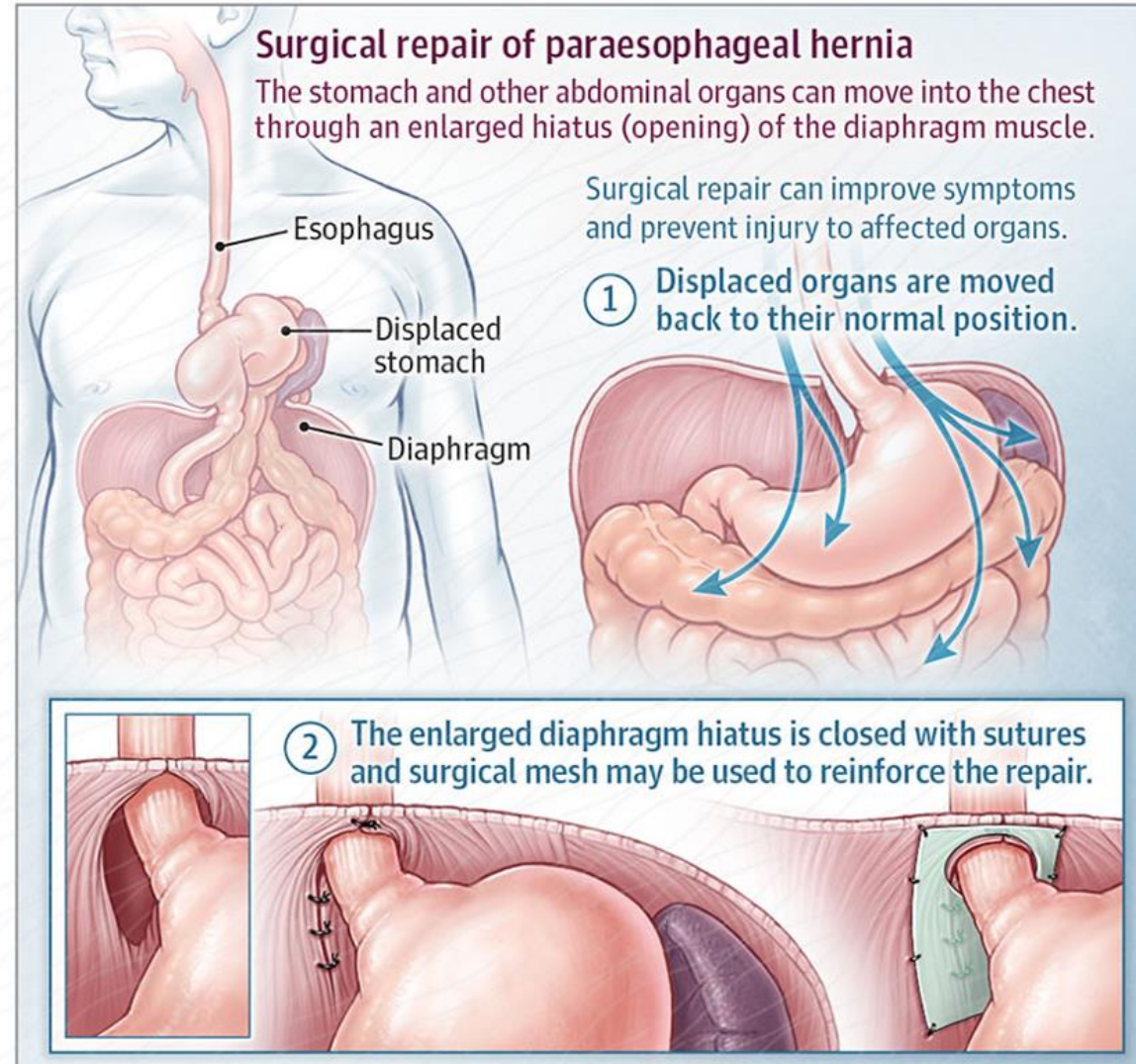
# VSG Conversion to RYGB

## Gastric bypass surgery

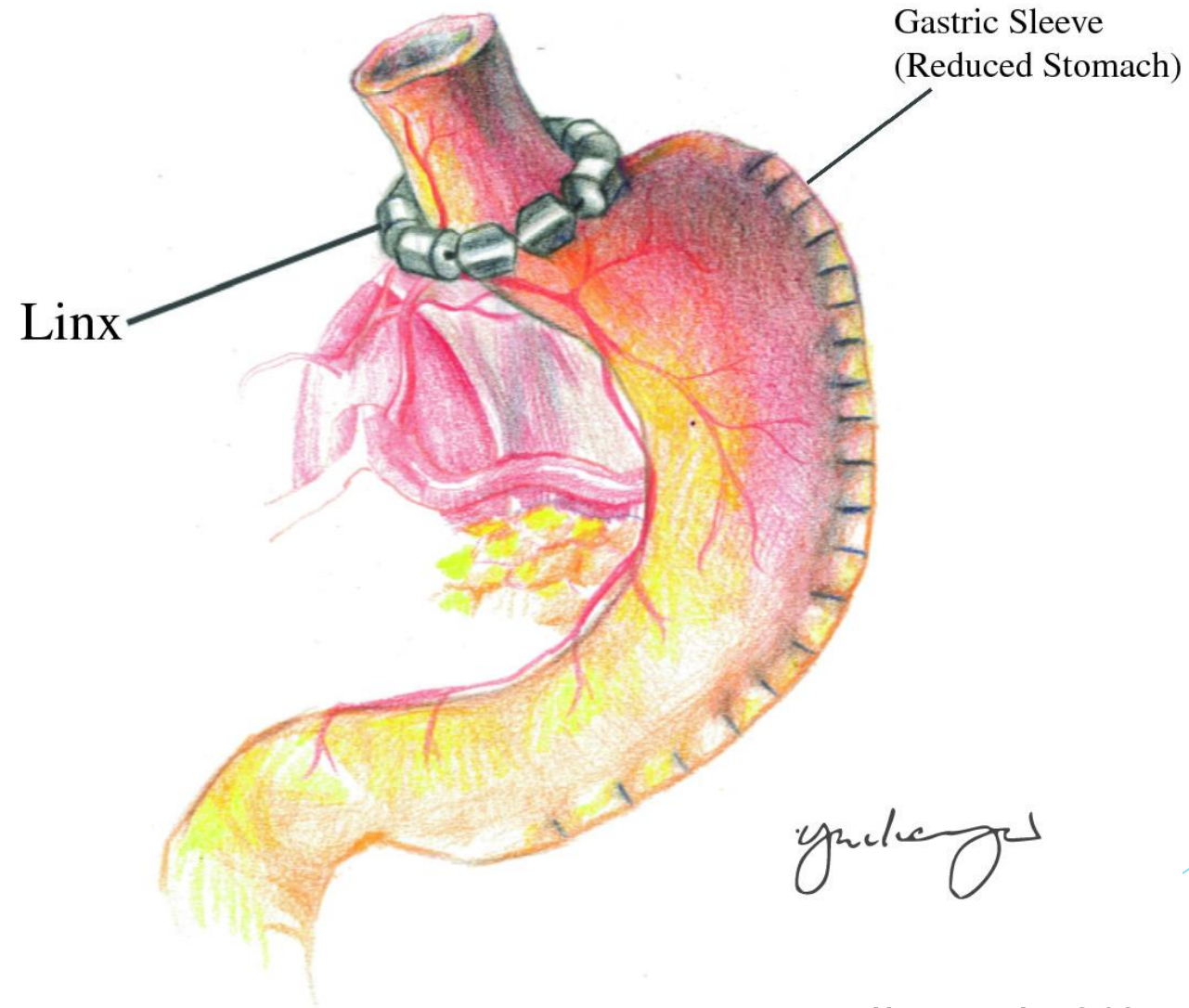
*Roux-en-Y*



# Hiatal Hernia Repair



# Magnetic Sphincter Augmentation



The background features a dark blue, almost black, trapezoidal shape on the left side. On the right side, there are several overlapping, semi-transparent geometric shapes in various shades of blue, ranging from light sky blue to deep navy blue. These shapes are primarily triangles and quadrilaterals, creating a layered, abstract effect. A thin white line runs diagonally across the right side of the image, intersecting the blue shapes.

Prevention

# Importance of Pre-Operative Work-Up and Multidisciplinary Approach

- ▶ Assessing for preoperative GERD in high-risk obesity population
  - ▶ pH/impedance or Bravo testing
  - ▶ Endoscopy
- ▶ Consideration of antireflux options for weight management
  - ▶ RYGB
  - ▶ Modified VSG\*
  - ▶ ESG



# INNOVATE-VSG

**UCI Specialty Areas:** Gastroenterology, Weight Loss & Management, Surgery

**Principal Investigator:** [Ninh Tuan Nguyen](#)

**Official Title:** Mechanistic and clinical outcomes of a surgical innovation aimed at minimizing GERD associated with vertical sleeve gastrectomy (INNOVATE-VSG)

**A Study On:**

Digestive - Gastrointestinal

Gastroesophageal Reflux Disease GE

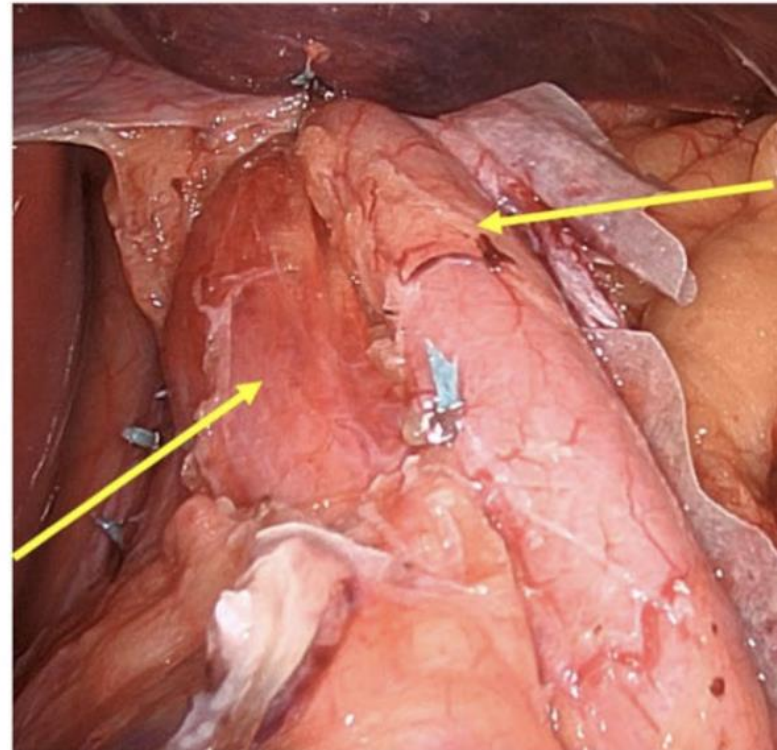
Clinical Trials Search

**Last Updated:** 2025/03/03

[Contact Our Study Team](#)

**OPEN TO ACCRUAL**

**Age Group:** Adults



Distal esophagus

Gastric cardia positioned adjacent to distal esophagus at the AOH

# Questions?

Call 888-717-4463 to schedule a consultation

Email questions to [anniw18@hs.uci.edu](mailto:anniw18@hs.uci.edu)