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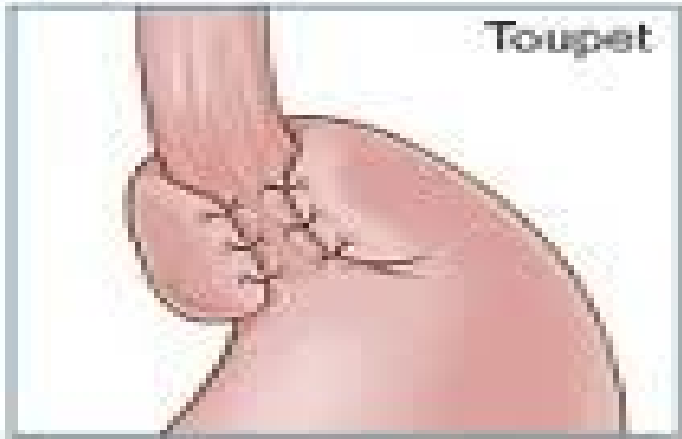
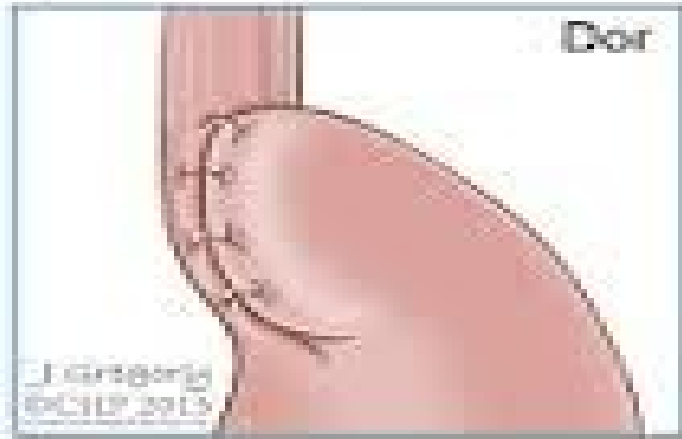
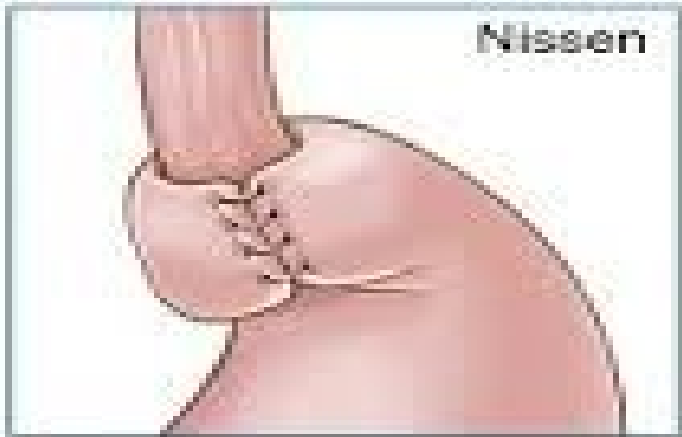
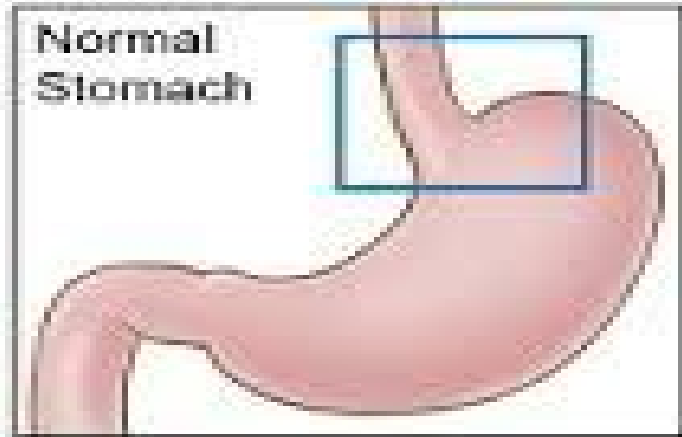
The Role of Surgery in GERD

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Objectives

1. Brief History of Surgical Treatment of GERD
2. Funduplications-the good and the bad
3. Magnetic Sphincter Augmentation
4. Understanding the importance of the diaphragmatic crura
5. How we can work together to individualize interventional treatment for GERD patients

Flavors of Fundoplication



Nissen Fundoplication-the good, the bad

- Safe operation
- 90-95% successful short term
- Normalizes acid exposure roughly 90% of patients
- Controls ALL types of reflux
- Long term up to 62% of patients on PPI (Spechler study-only 45% of surgical group available for follow up). Reasons for PPI use?¹
- Inability to belch or vomit, bloating/flatulence, dysphagia, diarrhea.

¹ [JAMA](#). 2001 May 9;285(18):2331-8

What About Partial Fundoplication?

- No long term difference in post-fundoplication side effects with Toupet¹
- Annals of Surgery 2013, Broeders et. al-Review and Meta-Analysis²
 - Anterior 180 vs. Nissen: PPI use and satisfaction similar at 1 and 5 years
 - 1 year Inability to belch 19% vs. 31%, Inability to relieve bloating 34% vs. 44%, dysphagia 21% vs. 33%
 - Dysphagia decreased at 5 years
 - Higher reoperation rate at 1 year for LAF (5.7% vs. 2.8%)

1) [Ann Surg.](#) 2011 May;253(5):875-8. doi: 10.1097/SLA.0b013e3182171c48.

2) [Ann Surg.](#) 2013 May;257(5):850-9. doi: 10.1097/SLA.0b013e31828604dd.

RCT Anterior 180° Fundoplication vs. Nissen (10 year f/u)

Table 1 Outcomes at 10 years for heartburn

	Total fundoplication (n = 48)	Anterior fundoplication (n = 41)	P
Heartburn (yes/no question)	7 (15)	8 (20)	0.580*
Heartburn analogue score			
Mean	1.7	2.3	0.111†
0	28 (58)	16 (39)	
1-3	14 (29)	13 (32)	
4-6	2 (4)	9 (22)	
7-10	4 (8)	3 (7)	
Taking proton-pump inhibitors	9 (19)	11 (27)	0.448*

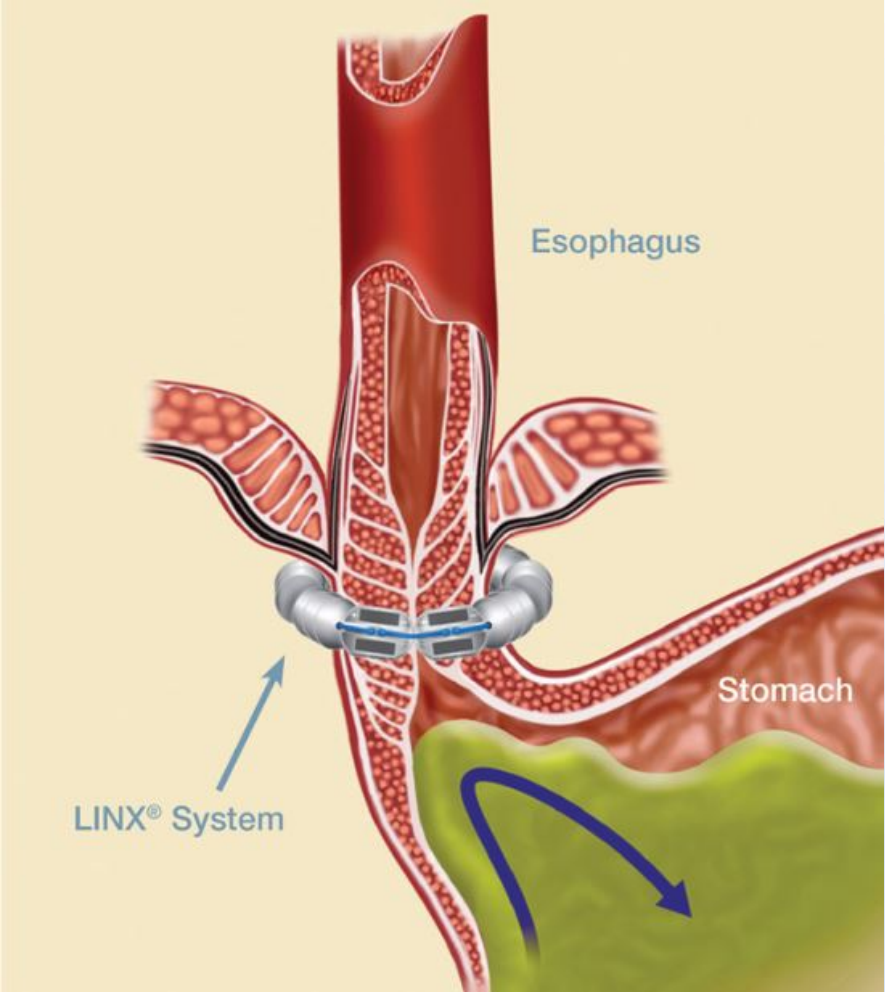
Values in parentheses are percentages. *Fisher's exact test; †Mann-Whitney *U* test.

Table 4 Assessment of overall outcome at 10 years

	Total fundoplication (n = 48)	Anterior fundoplication (n = 41)	P
Satisfied with outcome (yes/no question)	45 (94)	38 (93)	1.000*
Mean analogue score of satisfaction	8.2	8.3	0.707†
Would choose operation again	43 (90)	40 (98)	0.212*

Values in parentheses are percentages. *Fisher's exact test; †Mann-Whitney *U* test.

Magnetic Sphincter Augmentation



MSA-Results

Equivalent to Nissen Fundoplication with regard to pH normalization

Equivalent to Nissen with regard to decrease in PPI usage (80-90% off PPI at 5 years)^{1,2}

Much improved preservation of belch (95% vs. 66%)^{2*}

Much improved preservation of ability to vomit (94% vs. 50%)^{2*}

Much improved gas/bloating (27% vs 53%)^{2**}

Erosion Rate 0.3%³

Explantation Rate 3.3%³

*statistically significant

**did not reach statistical significance

1) [Clin Gastroenterol Hepatol](#). 2016 May;14(5):671-7. doi: 10.1016/j.cgh.2015.05.028. Epub 2015 Jun 2.

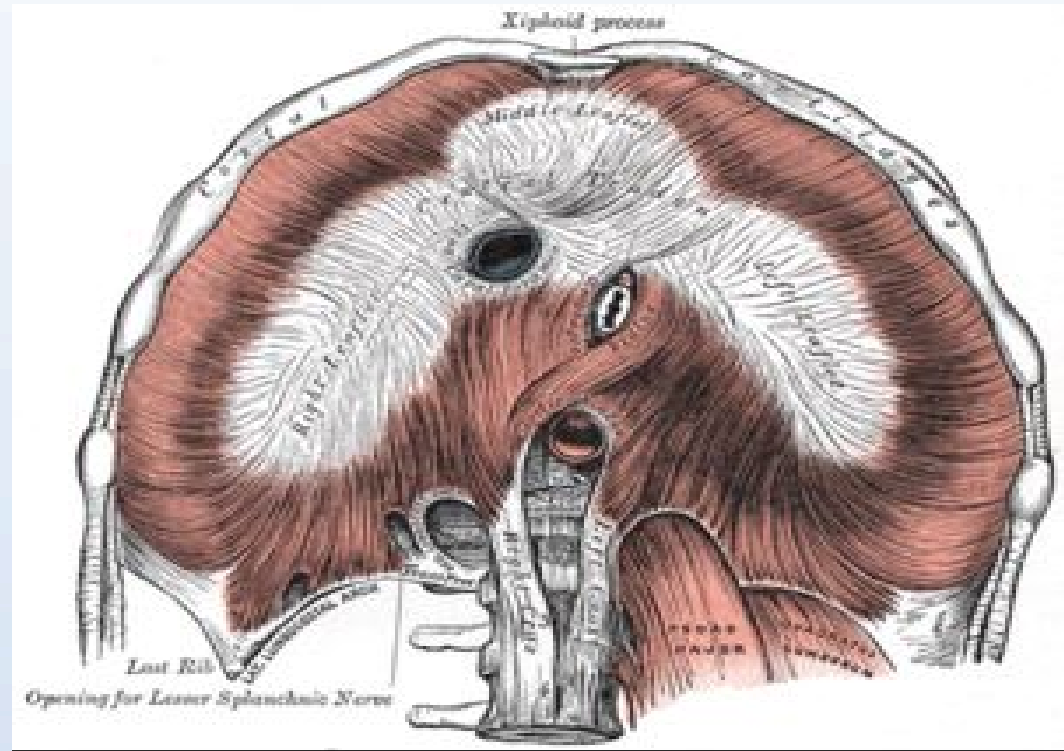
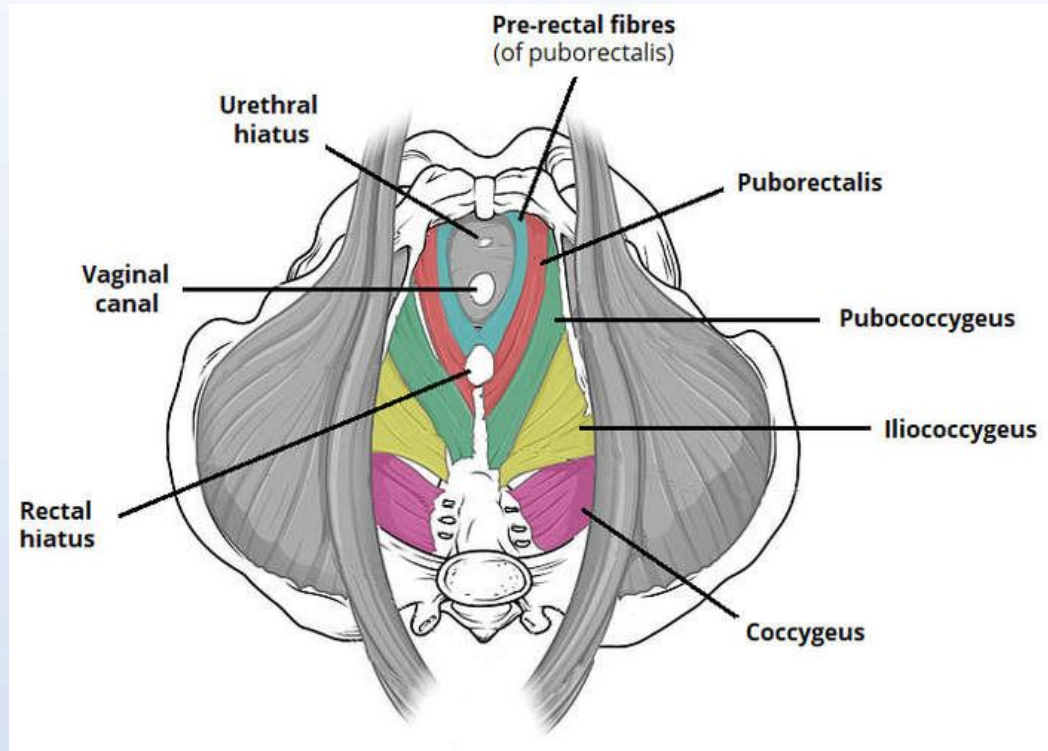
2) [Surg Endosc](#). 2017 Aug;31(8):3078-3084. doi: 10.1007/s00464-016-5370-3. Epub 2016 Dec 15.

3) [Dis Esophagus](#). 2019 May 9. pii: doz031. doi: 10.1093/dote/doz031. [Epub ahead of print]

GERD Barrier: LES + Diaphragmatic Crura

- Crural sling analogous to puborectalis
- Vagal Sensory and Motor Neurons Innervate BOTH the crura and the distal esophagus
- World J. of Surgery (2006), EMG response of crura to gastric and esophageal distension
 - 20 ventral/incisional hernia patients
 - Distension of esophagus=crural relaxation
 - Distention of stomach=crural contraction

Puborectalis Analogy



GERD and defective LES

- Patients with GERD have a defective anti-reflux barrier
- External and Internal components of LES must work together to be effective
- High rate of hiatal hernias in patients with GERD-like symptoms
 - 108 patients underwent MRI and Endoscopy
 - 79.4% had hiatal hernia identified by at least one of the modalities
- Anti-reflux procedures then have 2 crucial components
 - Crura must be repaired
 - LES must be augmented

[Eur Radiol](#). 2019 Jun 11. doi: 10.1007/s00330-019-06284-8. [Epub ahead of print]

Hiatal hernias in patients with GERD-like symptoms: evaluation of dynamic real-time MRI vs endoscopy.

[Seif Amir Hosseini A](#)¹, [Uhlig J](#)², [Streit U](#)², [Uhlig A](#)³, [Sprenger T](#)⁴, [Wedi E](#)⁵, [Ellenrieder V](#)⁵, [Ghadimi M](#)⁴, [Uecker M](#)^{2,6}, [Voit D](#)⁷, [Frahm J](#)^{6,7}, [Lotz J](#)^{2,6}, [Biggemann L](#)².

What Contributes the Most to Repair?

J. Gastrointestinal Surgery ¹

- 18 patients randomized to nissen-crural closure or crural closure-nissen
- Overall, LES length increased 1.3 cm, pressure increased 13.7 mm Hg
- Crural closure added 0.54 cm, Fundoplication added 0.72 cm
- Crural closure added 10.2 mm Hg vs. 3.5 mm Hg for fundoplication

Conclusion-Crural closure is vital to restoring LES pressures and creating effective anti-reflux barrier.

This is why endoscopic ONLY modalities fail to normalize acid exposure as effectively as surgical modalities.

1) [J Gastrointest Surg](#). 2013 Feb;17(2):236-43. doi: 10.1007/s11605-012-2074-4. Epub 2012 Nov 27.

Length and pressure of the reconstructed lower esophageal sphincter is determined by both crural closure and Nissen fundoplication.

[Louie BE](#)¹, [Kapur S](#), [Blitz M](#), [Farivar AS](#), [Vallières E](#), [Aye RW](#).

Which is Best?

Meta-analysis LNF vs. TIF vs. PPI

- LNF far superior at normalizing acid exposure (despite the fundoplication itself only adding 3.5 mm Hg to pressure at LES)
- LNF had highest probability of increasing LES pressure
- TIF had the highest probability of increasing HRQL (interesting)
 - GERD is a very subjective disease
 - Normalization of acid exposure is not necessary to improve Sx

[Gastroenterology](#). 2018 Apr;154(5):1298-1308.e7. doi: 10.1053/j.gastro.2017.12.021. Epub 2018 Jan 3.

Efficacy of Laparoscopic Nissen Fundoplication vs Transoral Incisionless Fundoplication or Proton Pump Inhibitors in Patients With Gastroesophageal Reflux Disease: A Systematic Review and Network Meta-analysis.

[Richter JE](#)¹, [Kumar A](#)², [Lipka S](#)³, [Miladinovic B](#)², [Velanovich V](#)⁴.

Conclusions

1. There is no perfect intervention for GERD
2. GERD is a SUBJECTIVE and OBJECTIVE disease (Barrett's with dysplasia patient is a different animal than typical GERD patient)
3. There is a place at the buffet table for all of these interventions (potentially)
4. The role of surgery may evolve, but proper interventional treatment of reflux almost always requires anatomic repair of the crura
5. Only surgery can accomplish repair of the crura