Why Laparoscopic Fundoplication is Better than Endotherapy

or

It may burn, but I won’t let you come close to it with that camera!!
What is GERD?

• Symptoms or mucosal damage produced by the abnormal reflux of gastric contents into the esophagus

• Cardinal Symptoms
  – Heartburn
  – Regurgitation

Epidemiology Of GERD

• 3rd most common GI disorder in the United States,
• Affecting 19 million adults
• Accounting, annually, for 4,590,000 outpatient visits and 96,000 hospitalizations.

Treatment Options

• Lifestyle Modifications
• Medical Therapies
• Surgical Therapies
• Endoscopic Therapies
Lifestyle Modification

• Head of bed elevation
• reflux-inducing foods (fatty foods, chocolate, peppermint and excessive alcohol, which may reduce lower esophageal sphincter pressure,)
• very acidic pH and can exacerbate symptoms. These include colas, red wine, and orange juice (pH 2.5 to 3.9).
• Refraining from assuming a supine position after meals and avoidance of meals before bedtime, both of which will minimize reflux.
• Obesity is a risk factor for GERD, erosive esophagitis, and esophageal adenocarcinoma
• Promotion of salivation by either chewing gum or use of oral lozenges may also be helpful in mild heartburn
• Restriction of alcohol use and elimination of smoking
  Restriction of alcohol use and elimination of smoking
Medical Management

• reduce gastric acid secretion with
  – H2 blocker or
  – proton pump inhibitor

• Goal to raise the intragastric pH above 4 during the periods of the day that reflux is likely to occur
  • Hunt, RH. Importance of pH control in the management of GERD. Arch Intern Med 1999; 159:649.
Medical Management

• These therapies do not prevent reflux, they remove the caustic elements of the refluxate

• Maintenance acid suppressive therapy is often necessary
Safety of Long Term Medical Rx

– Pneumonia

– Hypergastrinemia-
  • not yet consistent in humans/ may be different with H.pylori

– Atrophic gastritis –
Safety of Long Term Medical Rx

– Enteric infections
  • risk because acid is to protect.

– Vitamin B12 malabsorption
When Medical Therapy Fails
Further Options  
(our Debate)

• Surgery-
  – Nissen Fundoplication

• Endoscopic Procedures
  – Sewing/Plication Techniques
  – Radiofrequency Techniques
  – Injection Techniques
Pathophys considerations
Mechanisms Reflux

- Transient lower esophageal sphincter relaxations (tLESRs)
- A hypotensive lower esophageal sphincter (LES)
- Anatomic disruption of the gastroesophageal junction, probably associated with a hiatal hernia, the diaphragmatic sphincter
- Esophagogastric junction compliance
- Esophageal emptying in GERD/ Esophageal acid clearance
  - Peristaltic dysfunction
  - Re-reflux" associated with hiatal hernias, which also impair esophageal emptying
- Salivary function in GERD
- Obesity
Indications for Surgery

• Persistent or recurrent symptoms despite medical therapy
• Severe esophagitis by endoscopy
• Benign stricture
• Barrett's columnar-lined epithelium (without severe dysplasia or carcinoma)
• Recurrent pulmonary symptoms (eg, aspiration, pneumonia) in association with GERD
Nissen Fundoplication

• In 1936, Rudolph Nissen excised the cardia of the stomach in a patient who had an esophageal ulcer, and anastomosed the esophagus to the stomach. He buttressed the suture line by wrapping the fundus of the stomach around it and the lower esophagus.

• Years later Nissen noted that the patient had no heartburn, and rightfully attributed that to the “wrap” used at his surgery.

• In 1955, Nissen applied his theory and wrapped a patient who had reflux esophagitis.

• In 1956 he reported his work in the Swiss journal, *Schweizerische Medizinische Wochenschrift*. 
Nissen's original fundoplication

- Mobilized the lower 5 to 8 cm of esophagus
- Takedown of the gastrohepatic omentum, including the hepatic branch of the vagus nerve.
- Anterior and posterior walls of the fundus were wrapped around the esophagus
- Initial Complications included dysphagia and gas bloat syndrome
Nissen Modifications

• Donahue Floppy technique - 1985
  – 8 yr f/u of 77 pts. 97% symptom free
  • Used a 15 Hegar dilator underneath fundoplication
  • 50 Fr Esophageal bougie

Nissen Modifications

• Demeester - 1986
  – 60 French esophageal bougie, shortened the fundoplication length to 1 cm, and performed complete mobilization of the gastric fundus with division of the short gastric vessels.
  – Reported that 91% of patients remained symptom-free in a 10-year follow-period.
  – Importantly, the incidence of persistent dysphagia was decreased from 21% to 3%.

Laparoscopic Nissen

• Randomized trials to compare with open

• Seems it is equivalent to better because of decreased operative morbidity
<table>
<thead>
<tr>
<th>Study</th>
<th>Year</th>
<th>F/U period</th>
<th>Number patients</th>
<th>OR time (min)</th>
<th>(%) Postop pain</th>
<th>Postop hospital stay (days)</th>
<th>(%) patients with severe heartburn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nilson et al</td>
<td>2004</td>
<td>5 years</td>
<td>17 lap</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>23 open</td>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Ackreyd et al</td>
<td>2004</td>
<td>12 months</td>
<td>52 lap</td>
<td>82</td>
<td>4</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>47 open</td>
<td>46</td>
<td>30</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Chrysos et al</td>
<td>2002</td>
<td>3 months</td>
<td>56 lap</td>
<td>77</td>
<td>5</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>50 open</td>
<td>83</td>
<td>92</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Wenner et al</td>
<td>2001</td>
<td>6 months</td>
<td>30 lap</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>30 open</td>
<td></td>
<td></td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>Laine et al</td>
<td>1997</td>
<td>3 months</td>
<td>55 lap</td>
<td>88</td>
<td>na</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>55 open</td>
<td>57</td>
<td></td>
<td>6</td>
<td>4</td>
</tr>
</tbody>
</table>


### Outcomes of Laparoscopic Nissen Fundoplication

<table>
<thead>
<tr>
<th>Study</th>
<th>Median f/u</th>
<th>Complication rate</th>
<th>Late dysphagia</th>
<th>Satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dunnington 1993</td>
<td>2 yrs</td>
<td>17.2%</td>
<td>14.8%</td>
<td>93%</td>
</tr>
<tr>
<td>Pichter 1994</td>
<td>7.7 mo</td>
<td>4%</td>
<td>7%</td>
<td>100%</td>
</tr>
<tr>
<td>Hunter 1996</td>
<td>17 mo</td>
<td>8%</td>
<td>10%</td>
<td>97%</td>
</tr>
<tr>
<td>Frantzides 1998</td>
<td>N/A</td>
<td>1.9%</td>
<td>0.5%</td>
<td>99%</td>
</tr>
<tr>
<td>Peters 1998</td>
<td>21 mo</td>
<td>4%</td>
<td>7%</td>
<td>99%</td>
</tr>
<tr>
<td>Eubanks 2000</td>
<td>6 mo</td>
<td>4.5%</td>
<td>4%</td>
<td>93%</td>
</tr>
<tr>
<td>Lafullarde 2001</td>
<td>6 yrs</td>
<td>N/A</td>
<td>5%</td>
<td>90%</td>
</tr>
<tr>
<td>Bammer 2001</td>
<td>6.4 yrs</td>
<td>N/A</td>
<td>27.5%</td>
<td>96.5%</td>
</tr>
<tr>
<td>Carlson 2001</td>
<td>N/A</td>
<td>6%</td>
<td>3.4%</td>
<td>96%</td>
</tr>
<tr>
<td>Terry 2002</td>
<td>27 mo</td>
<td>2.1%</td>
<td>10%</td>
<td>94%</td>
</tr>
</tbody>
</table>
What they may tell you about the Lap Nissen

• Mainly based on one study
  • Spechler SJ, Lee E, Ahnen D, et al. Long-term outcome of medical and surgical therapies for gastroesophageal reflux disease follow-up of a randomized controlled trial. JAMA 2001;285:2331-8

• Follow-up of 37 patients treated with open (nonlaparoscopic) antireflux procedures, 23 (62%) patients reported using some form of antisecretory medication
HOWEVER

• Gastroesophageal reflux disease activity index (GRACI) was much lower in the surgical group (78 versus 89).
• 89% said they would pursue surgical therapy if they had it to do over again
• Surgery patients significantly less likely to take antireflux medications regularly
Another RCT for Surgical v Medical

- Surgical arm had a much lower failure rate than did the medical group 5 years after initiating treatment.

- 310 patients with erosive esophagitis enrolled in the trial.
  - 155 patients randomized to continuous omeprazole therapy and
  - 155 to open antireflux surgery, of whom 144 later had an operation,

- Symptoms, endoscopy, and quality-of-life questionnaires were used to document clinical outcomes.
Endoscopic Therapies

• Plication Techniques

• Radiofrequency Ablation

• Injection Therapies
Plication techniques

Bard sewing technique  Courtesy of Richard I Rothstein, MD and Charles Filipi, MD.
Bard sewing location below GE junction Reproduced with permission from C.R. Bard, Inc. Copyright © 2001. All rights reserved.
Plication techniques


• Initial American multicenter trial that provided data to the Food and Drug Administration
Initial Trial for Plication

• Multicentered trial,

• 64 patients with documented GERD were enrolled and randomly assigned to either a linear (n = 33) or circumferential (n = 31) configured plication

• Suggested plication is a safe outpatient treatment for GERD, with the expectation that about two-thirds of patients will be successfully treated at six months follow-up.
Initial trial Inclusions

• 3 or more episodes per week of heartburn when off antisecretory medications (with or without erosive esophagitis)
• benefit from and dependency upon continued use of antisecretory drugs for symptom control
• Documented acid reflux by pH monitoring.
Initial Plication trial Exclusions

- Dysphagia
- More than grade 2 esophagitis
- Body mass index greater than 40
- GERD refractory to proton pump inhibitors
- Hiatus hernia greater than 2 cm
Initial Trail of Plication

- Subjective Improvement
- Average heartburn score (frequency × severity, as measured by a visual analog score) improved 6 months after the procedure (62.7 versus 17.0, \( P = 0.0001 \))
- Improvement in two of the Short Form-36 subscale values (bodily pain and social functioning).
But…

- No difference in LES pressure before (16.1 mm Hg) and after (20.6 mm Hg)
- Three months after the procedure there was no change in the total percentage of acid exposure in the esophagus (9.63% versus 9.34%)
- However at 6 months a statistically significant difference was noted (9.63% versus 8.50%),
- BUT the amount of acid exposure was still more than twice the upper limit of normal.
But…

• 25% of the patients in the study had grade 2 esophagitis at baseline and 19% still had esophagitis at 6-month follow-up

• 62 percent of patients were still on medications 6 months after the procedure.

• 4 patients required multiple procedures to complete the plication

• 1 patient was hospitalized for 3 days with intravenous antibiotics and was discharged
2 year follow up study


- Seemed to imply the effect of this plication is not resilient
2 year follow up study

• still a difference in the heartburn severity scores compared with baseline (64.2 versus 44.4, \( P = 0.006 \)), but score was much higher than the 6-month scores in the original study (17.0).

• No new pH monitoring data,

• Most patients were on antisecretory medications 2 years after the procedure (75%)

• In fact, almost half (46.9%) were either on full-dose medications or underwent Nissen fundoplication.
More recent Plication Study

- Sixty-four patients with chronic heartburn that required maintenance antisecretory therapy
- At baseline and 12 months after plication, patients completed the GERD HRQL questionnaire, Gastrointestinal Symptom Rating Scale, and Health Survey, as well as a medication use diary.
- Ambulatory 24-hour pH monitoring and esophageal manometry were obtained at baseline and 3 months after plication. At 6 months after plication, the 24-hour pH study was repeated.
More recent Plication Study

- 57 patients completed 12-month follow-up
- 40 (70%) were no longer taking a proton pump inhibitor
- Median GERD HRQL scores were improved compared with baseline while taking medication (19.0 vs. 5.0; $p < 0.0001$) and while not taking medication (13.0 vs. 5.0; $p < 0.002$).
- At 6 months, an improvement in distal esophageal acid exposure was demonstrated in 40 of 51 patients (80%)
- Decrease of 39% in the median percentage of time the pH was less than 4 ($p < 0.0001$).

Problems

• Lack of a sham treatment group for comparison of the outcomes of treatment.
• Patients with certain characteristics common among patients with GERD were excluded from the study,
  – Esophagitis of grades III-IV,
  – Hiatal hernia more than 2 cm in length
  – Nonresponse to antisecretory therapy.
  – Only 1 year
More studies on Plication (Bard endocinch)

- Report from the Mayo Clinic
- Study of 23 subjects with a mean 6.7-month follow-up.
- 24 percent of patients had undergone a repeat session of plication treatment, suggesting that the initial treatment failed to adequately control symptoms.
- About two-thirds of patients had partial or complete relief of their heartburn symptoms.
- Only 20 percent were able to be off anti-reflux medications.

More studies on Plication
(Bard endocinch)

• The procedure considered to have failed in this report
• 38 patients who were followed prospectively for one year
• None of the patients had all of the initially placed gastroplications (90 percent were lost)
• The percentage of patients who did not require a proton pump inhibitor decreased from 52 percent at two months to only 20 percent at one year.

More studies on Plication
(Bard endocinch)

• Similar conclusions were reached in another report
• 18 months of follow-up
• All sutures remained in situ in only 12 of 70 patients
• no remaining sutures could be detected in 18 patients.
Non-randomized prospective study of Lap nissen v transesophageal endoscopic plication

- 24 consecutive patients treated with LNF, and 27 managed by TEP were studied.
- Pre- and posttreatment evaluations of
  - Symptom severity scores,
  - Endoscopy,
  - 24 h esophageal pH
  - Esophageal manometry
  - Quality-of-life assessments
Non-randomized prospective study of Lap nissen v transesophageal endoscopic plication

• Both techniques improved
  – symptom score
  – acid regurgitation
  – quality of life
  – reduced the requirements for PPIs

• The control of heartburn and acid reflux was better for LNF.

• More dysphagia in the LNF group

Comparison of transesophageal endoscopic plication (TEP) with laparoscopic Nissen fundoplication (LNF) in the treatment of uncomplicated reflux disease. AUMahmood Z; Byrne PJ; McMahon BP; Murphy EM; Arfin Q; Ravi N; Weir DG; Reynolds JV. Am J Gastroenterol. 2006 Mar;101(3):431-6
Radiofrequency Ablation Technique (Stretta)

- The Stretta radiofrequency energy delivery system device delivers computer-regulated radiofrequency energy to the GEJ zone at 56 separate sites
- The thermal lesions reportedly cause shrinkage and cellular response in the submucosal tissue surrounding the puncture sites, decreasing the frequency of gastric reflux and transient lower esophageal sphincter (LES) relaxations
The "Stretta" procedure Radiofrequency energy catheter positioned within esophageal lumen at gastroesophageal junction. Courtesy of George Triadafilopoulos, MD.

The "Stretta" procedure Diagram showing the balloon inflation, deployment of needles, RF energy delivery, and irrigation of the mucosa. George Triadafilopoulos, MD.
Stretta Studies

• 1 randomized controlled trial….

Stretta RCT

• 64 patients were entered from 8 centers
• At 6 months, the heartburn quality-of-life scores improved, and heartburn symptoms decreased.
• However, the median acid-exposure (% time pH <4) increased from 9.3% to 10.7%.
• At 6 months, the patients in the sham group were offered Stretta therapy, making a longer comparison impossible.
Stretta RCT

• Subsequently, both the crossover and original treatment groups apparently showed improvement.
• Additionally, although 47% of patients receiving Stretta treatment were off all therapy at 6 months, 37% of sham patients were also off medications.
• The overall effectiveness of the radiofrequency ablation technique for preventing GERD has not been substantiated, compared with placebo, in this first randomized, controlled clinical trial.
Stretta Study that compared it with LNF

- Patients were offered the Stretta procedure if
  - they had documented GERD and
  - did not have a hiatal hernia larger than 2 cm,
  - LES pressure less than 8 mmHg,
  - or Barrett's esophagus.

- Patients were offered LNF if
  - larger hiatal hernias,
  - LES pressure less than 8 mmHg,
  - or Barrett's

Stretta Study that compared it with LNF

• At 6 Months
  • Equal magnitude of improvement between pre- and postoperative subjective measures.
  • Fifty-eight percent of Stretta patients were off proton pump inhibitors, and an additional 31% had reduced their dose significantly;
  • 97% of LF patients were off PPIs.
  • Twenty-two Stretta patients returned for 24-hour pH testing at a mean of 7.2 +/- 0.5 months, and there was a significant reduction in esophageal acid exposure time.
  • Both groups were overall satisfied with their procedure
Stretta Complications

• Postmarketing evaluation of >1,200 cases
  – 2 deaths
  – Other complications included
    • bleeding (0.17%)
    • mucosal ulcerations (0.08%)
    • pleural effusions (0.08%)
    • perforations (0.33%)

• Overall complication rate of 0.83%

Stretta Complications

• Of 118 patients:
  • 13 patients with chest discomfort for 2 to 5 days,
  • 7 patients with mild transient nonobstructive dysphagia,
  • 2 patients with delayed bleeding (1 to 3 weeks postprocedure) that did not require transfusions.

• Total morbidity reported in this study was 1.7%.
Injection Therapy

• First pioneered in the 1980s

• Abandoned when it became apparent that the need for frequent implantation sessions because of implant reabsorption would limit its useful
Clinical studies so far

• Excluded
  – hiatal hernias ≥3cm
  – severe esophagitis
  – Barrett's esophagus
  – body mass index ≥35
  – esophageal or gastric varices
  – Prior gastric or GERD surgery
  – non-GERD esophageal motility disorder
  – scleroderma or other autoimmune disorder
  – use of anticoagulants other than aspirin at 300 mg or less per day
  – presence of esophageal or gastric cancer.
Conclusions

• Endoscopic therapies
  – Hold promise
  – Still much to be determined
  – Thus far little overlap between study candidates and typical candidates for Lap Nissen
  – Perhaps they will serve as a bridging therapy
Conclusions

• Lap Nissen is still better for well selected patient’s with GERD.
• Endoscopic therapies may prove very useful in the future with further refinement and study.
• For now...the Lap Nissen IS the gold standard for invasive GERD management.