Heartburn - How Often, How Much?

- 44-50% experience GER once per month
- 20% experience GER once per week
- 7% experience GER daily
- $5-8B expended annually on symptoms alone

Early concepts of GERD

- 1934 Hamperl introduces 'peptic esophagitis' (Europe).
- 1951 Philip Allison proposed reflux esophagitis is related to sliding esophageal hiatus hernia (anatomic defect) - conceived 'Allison Procedure' – 50% failure rate
- 1950s Belsey clearly separated hiatal hernia from reflux disease (80%/20%)
  – first hint that GER is a physiologic defect
- 1955 Belsey developed transthoracic repair

Early concepts of Barrett’s

- Norman Barrett - Australian born British surgeon described the “columnar lined esophagus” in 1950 (although he wasn’t the first)
  - Barrett NR, Br J Surg 1950;38:175-82
- Introduced the term “reflux esophagitis” in this article, but didn’t draw the connection
- Promoted developmental etiology for columnar lined esophagus

Evolving concepts of GERD

- 1966 Booth described ‘esophageal acid clearance’ and concept of ‘dwell time’.
- 1974 Johnson & DeMeester introduced 24hr pH monitoring w/ quantitative scoring to define esophageal acid exposure
- 1977 Little linked gastric emptying dysfunction to reflux as another etiology
The Gastroesophageal Junction

What Causes GERD?

Extrinsic Factors:
Deterioration of natural barrier to reflux; the Antireflux Valve

Normal Anatomy
Fully Functional Valve Prevents Reflux

Normal Anatomy
Antireflux Valve Tight to the Scope

What Causes GERD?

Extrinsic Factors:
Deterioration of natural barrier to reflux; the Antireflux Valve

Dysfunctional Valve
Can’t close. Loose to the scope.

Contributors to GERD

TABLE 34-1 Foods and Medications That May Worsen GERD Symptoms

Decomposed lower esophageal sphincter pressures

Foods
Fast food
Cranberries (peppermint, spaniard)
Chocolate
Coffee, tea

Medications
Anticoagulants
Bacteriostatic
Caffeine
Dihydropyridine calcium channel blockers
Cortisone
Diuretics
Langue
Magnesium
Nonsteroidal anti-inflammatory drugs

Brief irritants to the esophageal mucosa

Foods
Acidic foods
Orange juice
Meditative
Alcohol
Aspirin
Nonsteroidal anti-inflammatory drugs

Mimics

• Angina /MI
• Asthma
• Symptomatic cholelithiasis
• Peptic ulcer disease
• Gastric, retroperitoneal or pancreatic tumor
• Pancreatitis
• Pneumonia
• Enteritis
• Effect of medications, supplements or potions

Typical and Atypical Symptoms

• Heartburn
• Chest discomfort
• Sensation of laryngopharyngeal acidity
• Regurgitation of excessive saliva (sialorrhoea/water brash)
• Coughing and choking (post prandial period or when bending over)
• Chest pain
• Dysphagia
• Odynophagia
• Hoarseness
• New onset asthma or recurrent bouts of pneumonia.
• Upper esophageal foreign body sensation with swallowing (globus hystericus)
Old" Treatment Options for GERD

Antacids: Acid Neutralizers

- **Alka-Seltzer** – NaHCO₃ and/or KHCO₃
- **Gaviscon** – Al(OH)₃
- **Maalox (liquid)** – Al(OH)₃ and Mg(OH)₂
- **Maalox (tablet)** – CaCO₃
- **Milk of Magnesia** – Mg(OH)₂
- **Pepto-Bismol** – CaH₃BiO₄
- **Pepto-Bismol Children’s** – CaCO₃
- **Rolaids** – CaCO₃ and Mg(OH)₂
- **Tums** – CaCO₃
- **Mylanta** - contains Al(OH)₃

“New” Types of Medications

- **H₂ blockers** (ranitidine, cimetidine)
  - Blocks the body’s signal to the stomach to produce acid
- **Proton Pump Inhibitors (PPIs)**
  - Blocks the secretion of acid into the stomach

PPI Complications

- Vitamin B12 Deficiency
- Increased Risk of Nervous System Infections
- Increased Risk of Bacterial Overgrowth

PPI Therapy and Fractures

Table 2: The association between PPI therapy and fracture

<table>
<thead>
<tr>
<th>Study</th>
<th>% of patients with a fracture who received PPIs</th>
<th>% of controls who received PPIs</th>
<th>Unadjusted OR (95% CI)</th>
<th>Adjusted OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wang et al. (2005)²</td>
<td>3.9</td>
<td>2.8</td>
<td>1.77 (1.61-1.96)</td>
<td>1.5 (1.26-1.78)</td>
</tr>
<tr>
<td>Wernig et al. (2009)³</td>
<td>11.7</td>
<td>8</td>
<td>1.49 (1.27-1.73)</td>
<td>1.18 (1.02-1.37)</td>
</tr>
<tr>
<td>Tagawa et al. (2006)⁴</td>
<td>1.7</td>
<td>0.9</td>
<td>2.53 (1.40-4.59)</td>
<td>1.12 (1.01-1.25)</td>
</tr>
<tr>
<td>Pransky et al. (2007)⁵</td>
<td>4.5</td>
<td>2.9</td>
<td>1.60 (1.01-2.54)</td>
<td>1.28 (0.84-2.01)</td>
</tr>
<tr>
<td>Coyte et al. (2010)⁶</td>
<td>4.6</td>
<td>3.7</td>
<td>1.29 (1.27-1.40)</td>
<td>1.22 (1.05-1.44)</td>
</tr>
</tbody>
</table>

²These are non-randomized studies that included adjusted and unadjusted odds ratios. Risk estimates significant at p<0.05 after Bonferroni correction. Risk estimates for any association in this study have not been corrected for multiple comparisons. The adjusted odds ratios come from multivariate analyses.

Predictors of a Satisfied Patient following Fundoplication

- Responsive to PPI's
- Typical Symptoms of GERD
  - Heartburn/regurgitation
- Abnormal 24 hour pH study
  - If all present 98% satisfied or extremely satisfied with operation
  - If all absent – forget about it!
  - Peters, Crookes, and DeMeester, Arch Surg 1997

GERD Evaluation Tools

- Form
  - Barium Swallow-dynamic
  - EGD
- Function
  - 24 hour ambulatory pH
  - Esophageal Motility Study
  - Gastric Emptying Study

24 hour ambulatory pH

- Who should have this test preoperatively?
  - Atypical (supraesophageal) symptoms alone
  - Non responders to PPI
  - No evidence of esophagitis on EGD
- pH study unnecessary in the majority of patients preoperatively
  - Waring DG. Dig Dis Sciences, 1994

The cancer connection

- Barrett esophagus:
  - endoscopically visible columnar epithelium with intestinal metaplasia on biopsy, within the esophagus.
  - Intestinal metaplasia = acid-mucin containing goblet cells
  - Sampliner, Practice Parameters, Am J Gastro, 1998
- 10% of GERD patients have Barretts!

Barrett esophagus:

- Endoscopically visible columnar epithelium with intestinal metaplasia on biopsy, within the esophagus.
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10% of GERD patients have Barretts!
Early Laparoscopy


Rudolf Nissen (1896-1981)

- Assistant to Sauerbruch, 1921-1927
- Associate Professor, University of Berlin, 1927-1933
- To Istanbul University, 1933
- Head of First Surgical Clinic

Istanbul University, First Surgical Clinic, circa 1938

and intestinal resections, lumbar sympathectomies, tho-
racoplasties, Schede plasties and very dangerous opera-
tions for heart injuries were carried out….” (Figs 2 and

Positioning
Dr. Nissen was one of the pioneers of thoracic surgery. He performed the first reported successful pneumonectomy in a 12 year-old girl with bronchiectasis of the left lung, which was the result of trauma and partial occlusion of the left stem bronchus."

Rudolf Nissen (1896-1981)

"Nissen's Original Fundoplication"
- Described originally in 1936 for protection of repair after esophageal/cardia resection for ulcer
  - Observed lack of reflux 16 years later
  - Used in 1955 on 49 year old with intractable GERD via laparotomy.

Rudolf Nissen MD

Move to U.S.

In 1939, during an operation, he experienced sudden tremor and high fever. He was aware that the retained bullet from World War I in his lung had caused a lung abscess. Also, his wife had left for the United States and was expecting a baby. So, he left for the United States with permission. A few months after his departure, World War II began, and although he had a chance for return, the circumstances were not suitable. By 1943, the

The current surgical standard
- for virtually all GERD except severe esophageal dysmotility
- 360 degree, short (1-2cm), floppy, laparoscopic fundoplication.
- performed over a large bougie (>56 fr.)
- short gastric vessels divided
- crura closed

Predictors of a Dissatisfied Patient Following Fundoplication
- Normal pH study
  - (Swanson, Peters, others)
- Preoperative impairment in quality of life
  - mental health, general health, physical role, emotional role

Velanovich V. Arch Surg.
Indications for Surgery (ACG)

- GERD refractory to medical therapy - rare
- Complicated GERD (Stricture, Aspiration)
- Supraesophageal GERD (SLR)/Regurgitation
- GERD requiring daily PPI for control of symptoms
- Not Barrett’s Esophagus alone
- Responsive to PPI——but
  - Quality of life
  - Medication Dependence
  - Young age
  - Side effects of medication
  - Cost of medication

Once a Simple World…..2007

- Mild GERD, easily controlled - PPI
- Moderate to severe GERD with frequent “breakthrough” sx - Lap Nissen
- Role for endoscopic therapy is yet to be defined.

Nordic RCT of PPI vs. Nissen (n = 298)

- p<.01
- p<.05

LOTUS Trial-Interim Analysis

Cochrane statement- Review of 4 RCT’s

- There is evidence that laparoscopic fundoplication surgery is more effective than medical management for the treatment of GORD at least in the short to medium term. Surgery does carry some risk and whether the benefits of surgery are sustained in the long term remains uncertain.
Difficulties with RCT’s –to date

• “a surgeon doesn’t want to operate on a patient who has failed PPI’s”
• Most studies have randomized patients who respond well to PPI’s
  – Why bother?
  – Not surprising that PPI and Surgery perform equivalently

So What’s Changed in 4.5 Years?

• 2007 - Single Question
  – When Should I Call a Surgeon for a Fundoplication?
• 2012 - Compound Question
  – What is PPI Failure to a Surgeon and What Patients are More Likely to Respond to Fundoplication?
  – Acknowledgment that symptomatic PPI Failures are not that unusual

What do we know about PPI Failure?

• It affects up to 40% of GERD patients
• PPI escalation has limited value
  – BID dosing better than “double dosing”
• Changing PPI has limited value
• Decrease TLESR’s
  – Baclofen
• Neuromodulation
  – Tricyclics and SSRIs
• Promote gastric emptying
  – Prokinetics and botulinum toxin

PPI Failure- A Surgeon’s Perspective

• Symptomatic Failure
  • Troublesome Reflux Symptoms Despite Adequately Dosed PPI
  • “Troublesome”
  • Mild Reflux- 7 days a week
  • Moderate to Severe Symptoms 2-3 days/week

Symptom response LARS (n=1000)

Antireflux surgery is ideally suited for a patient with great heartburn control with PPI but ongoing troublesome regurgitation.
When PPI is compared to Placebo (7 RCT) the therapeutic gain for regurgitation is only 17%.

Kahrilas. Am J Gastro, 2011 (epub)

11 Year follow up of Lap Nissen

Time to redo operation

Kaplan Meier Curve for Redo operations- 8% at 11 years


What Patient is most likely to benefit from antireflux surgery in 2012?

- Proven GERD, heartburn PPI responsive
- “Breakthrough” HB – troublesome symptoms
- Regurgitation uncorrected by PPI
- Extra esophageal symptoms
  - Improved with PPI
  - Not improved but reflux well proven and other causes of symptoms eliminated
- Large fixed hiatal hernia with non reflux symptoms (post prandial chest pain, anemia, etc)

Where are we with endoscopic and novel laparoscopic methods for managing PPI failure?

Treatment Options

A NEW Alternative

TIF with Esophyx
“Front Line Surgical Management”

Mild GERD

Anatomical Changes

Severe GERD

Today’s Approach

Lifestyle Change

Pharmaceutical (Rx and OTC)

Surgical
Transoral Incisionless Fundoplication – Improving on 50%

24 paired studies
65% normalized
75% improved

Bell – Surg Endo (in press)

Torax Linx Device

Phase 2 data complete-
Excellent reflux control
FDA application in process

Fundoplication: Before & After

Exophgeal Reflux Episodes Pre TIF & Post TIF
Mean SDS X

24 paired studies
65% normalized
75% improved