Modern Evaluation for Antireflux Surgery

Thomas J. Watson, M.D.
Associate Professor of Surgery
Chief of Thoracic Surgery
Division of Thoracic and Foregut Surgery
University of Rochester School of Medicine and Dentistry

AATS/STS General Thoracic Surgery Symposium
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“The Rise and Fall of Antireflux Surgery in the United States”

• Data from the Nationwide Inpatient Sample
• Peak in 1999 at 31,700 cases (15.7 cases per 100,000 adults)
• Steady decline thereafter
• 30% decrease by 2003 to 24,000 cases (11 cases per 100,000 adults)
• Reasons?

Problems with Antireflux Surgery

Realities that Surgeons Must Acknowledge...

• Inconsistent patient selection
• Inconsistent delineation of expectations
• Inconsistent work-up
• Inconsistent operative techniques
• Inconsistent results across centers
Problems with Antireflux Surgery

Realities that Surgeons Must Acknowledge…

- Inconsistent patient selection
- Inconsistent delineation of expectations
- Inconsistent work-up
- Inconsistent operative techniques
- Inconsistent results across centers
Goals of Evaluation for Antireflux Surgery

1) Elucidation of symptoms
   • GERD-related
   • Others

2) Estimation of probability of a successful symptomatic response

3) Objective confirmation of presence of GERD

4) Assessment of comorbidities
   • Candidacy for surgery
   • Potential complications
Goals of Evaluation for Antireflux Surgery

5) Associated anatomic abnormalities
6) Associated functional abnormalities
7) Planning the type of fundoplication, the operative approach and the likelihood of needing to perform an esophageal lengthening procedure
The Importance of Symptom Assessment

• Primary *versus* secondary symptoms (*i.e.* motivation for surgical intervention)
• Typical *versus* atypical symptoms
• Responsiveness of each symptom to PPI therapy
• Likelihood of response of each symptom to surgery
• Clear delineation of expectations (both good and bad)
“Multivariate Analysis of Factors Predicting Outcome After Laparoscopic Nissen Fundoplication”

1) Abnormal pH score (odds ratio = 5.4)
2) Typical primary symptom (odds ratio = 5.1)
3) Response to acid suppression therapy (odds ratio = 3.3)

## Combined Effect of Predictors on Outcome

<table>
<thead>
<tr>
<th>24 hr pH</th>
<th>Primary Sx</th>
<th>Response to Tx</th>
<th>Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>Atypical</td>
<td>Poor/None</td>
<td>1.0</td>
</tr>
<tr>
<td>Normal</td>
<td>Typical</td>
<td>Complete/Partial</td>
<td>16.7</td>
</tr>
<tr>
<td>Abnormal</td>
<td>Atypical</td>
<td>Complete/Partial</td>
<td>17.7</td>
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<td>Typical</td>
<td>Poor/None</td>
<td>27.2</td>
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<tr>
<td>Abnormal</td>
<td>Typical</td>
<td>Complete/Partial</td>
<td>89.8</td>
</tr>
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</table>

Relief of Typical Reflux Symptoms with Open or Laparoscopic Nissen Fundoplication

- 90-95% at 2-3 years\(^1,2\)
- 85-90% at 5-10 years\(^3-9\)

Gastroesophageal Reflux Disease (GERD)

- Esophagopharyngeal reflux
  - Regurgitation
  - Sore throat
  - Bad taste
  - Dental problems
  - Hoarseness

- Pharyngotracheal reflux
  - Nocturnal cough
  - Wheezing, choking
  - Shortness of breath

- Gastroesophageal reflux
  - Heartburn
  - Chest pain
  - Dysphagia
  - Water brash

- Gastric hypersecretion
  - Anorexia
  - Nausea
  - Bloating
  - Vomiting
  - Epigastric pain

- Duodenogastric reflux
  - Epigastric pain
  - Right upper quadrant pain
## Extraesophageal Manifestations of GERD

<table>
<thead>
<tr>
<th>ENT</th>
<th>Pulmonary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laryngitis</td>
<td>Cough</td>
</tr>
<tr>
<td>Pharyngitis</td>
<td>Asthma</td>
</tr>
<tr>
<td>Otitis</td>
<td>Pulmonary fibrosis</td>
</tr>
<tr>
<td>Sinusitis</td>
<td>Chronic bronchitis</td>
</tr>
<tr>
<td>Hoarseness / voice changes</td>
<td>Pneumonia</td>
</tr>
<tr>
<td>Throat clearing</td>
<td></td>
</tr>
<tr>
<td>Globus sensation</td>
<td></td>
</tr>
<tr>
<td>Subglottic stenosis</td>
<td></td>
</tr>
<tr>
<td>Dental erosions</td>
<td></td>
</tr>
</tbody>
</table>

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Prevalence of Extraesophageal Symptoms in Patients Referred for Antireflux Surgery

Symptoms in 61%

39%
45%
16%

Extraesophageal and GI Sxs
Extraesophageal Sxs only
GI Sxs only

(N = 636)

Montreal GERD Consensus Conference

Atypical Symptoms

- Extraesophageal symptoms rarely occur in absence of typical GERD symptoms
- Extraesophageal symptoms typically multifactorial
- Data substantiating beneficial effect of treatment weak

The Problem with Defining Extraesophageal Manifestations of GERD

• Symptoms  -- Unreliable
• Mucosal injury  -- Unreliable
• Esophageal acid exposure  -- Unreliable
Occult GERD and Respiratory Symptoms

**Limitations of Ambulatory pH Monitoring**

- Accuracy, reproducibility
- Discomfort, cost
- Proximal probe
  - Placement?
  - Relevance of normal values?
- An abnormal pH score does not always predict which patients will respond to therapy
- GERD can be contributory even with a normal pH score
  - Limited or remote reflux episodes can cause symptoms
  - Non-acid reflux
# Diagnostic Studies

<table>
<thead>
<tr>
<th>Acceptable / Standard</th>
<th>State of the Art</th>
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<tbody>
<tr>
<td>I. Flexible endoscopy</td>
<td>I. High resolution/definition, NBI, etc.</td>
</tr>
<tr>
<td>II. Barium UGI studies</td>
<td>II. Video esophagography</td>
</tr>
<tr>
<td>III. Stationary manometry</td>
<td>III. High resolution manometry</td>
</tr>
<tr>
<td>IV. Transnasal pH monitoring</td>
<td>IV. Bravo probe</td>
</tr>
<tr>
<td>V. Multichannel intraluminal impedance (MII)-pH monitoring</td>
<td></td>
</tr>
</tbody>
</table>
Adjuncts to Flexible Endoscopy

• High resolution / high definition endoscopy
• Virtual chromoendoscopy or narrow band imaging (NBI)
• Vital staining
  1.5% acetic acid
  0.5% methylene blue
  1.0% Lugol’s solution for squamous cell CA
Barrett’s without staining
Barrett’s with Acetic Acid
# USC Protocol for Video Esophagograms

<table>
<thead>
<tr>
<th>Patient position</th>
<th>Purpose</th>
<th>Technique</th>
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<tbody>
<tr>
<td>Prone right anterior oblique</td>
<td>Esophageal body fxn</td>
<td>5 separate 10-mL swallows, 15 s between each, follow bolus on video</td>
</tr>
<tr>
<td></td>
<td>Esophageal diameter</td>
<td>Rapid swallow of several gulps to distend esophagus</td>
</tr>
<tr>
<td></td>
<td>Gastric fxn</td>
<td>Video activity of stomach and duodenum for 30 s in prone position</td>
</tr>
<tr>
<td>Supine</td>
<td>Relationship of GEJ to hiatus</td>
<td>2-3 swallows focused on GEJ</td>
</tr>
<tr>
<td>Erect</td>
<td>Crico fxn</td>
<td>Lat and AP views of oropharynx and upper esophagus; 1-2 swallows of GEJ; video of 2 contrast-coated hamburger boluses</td>
</tr>
<tr>
<td></td>
<td>Reducibility of hernia</td>
<td></td>
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<tr>
<td></td>
<td>Solid bolus transport</td>
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</table>
Stationary Esophageal Manometry

**Aims**

- Exclude alternate or concomitant diagnosis to GERD such as a primary esophageal motility disorder
- Identify position of LES for transnasal pH (or combined impedance/pH) monitoring
- Disease severity stratification by assessment of LES competency and adequacy of peristalsis
- Esophageal length
Stationary Esophageal Manometry

**Equipment**

- **Solid state systems**
- **Water-perfused systems**
  - Arndorfer pneumohydraulic pump
  - 8 channel PVC catheter
    - 4 channels at 5 cm increments, 90 degree rotation
    - 4 circumferential channels at 90 degree rotation
  - Data acquisition software/hardware
Manometry Accessories

Water Perfused Manometry Accessories

We have water perfused manometric catheters for esophageal, anorectal and vector volume examinations. All our Zinetics Water Perfused Catheters are made using clear, medical grade PVC tubing to ensure a high quality level.

Zinetics Esophageal Water Perfused Catheters:

For pressure measurement in the esophagus you will find a number of standard catheter configurations for adult and pediatric procedures. Our catheters have the following features and benefits:

- A firm catheter body for easy intubation
- Wide range of standard and special configurations
- High quality Luer Locks for durability

<table>
<thead>
<tr>
<th>Adult Esophageal</th>
<th>Pressure Ports</th>
<th>20 cm</th>
<th>15 cm</th>
<th>11 cm</th>
<th>5 cm</th>
<th>0 cm</th>
<th>Obtained</th>
<th>Catheter cross section</th>
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</table>
Stationary Esophageal Manometry

Testing Protocol

• LES Analysis
  – Station analysis
    • Total Length
    • Abdominal / Thoracic Length
    • Mean resting pressure
  – Relaxation

• Esophageal body study
“Physiology of the LES”

Gastric Baseline Pressure

10 Sec.

Abdominal Length

RIP = Respiratory Inversion Point

Overall Length

Esophageal Baseline Pressure

37 cm.

RIP

43 42 41 40 39 38
High-Resolution Manometry

- 4.2 mm catheter
- 36 solid-state circumferential sensors at 1 cm intervals
- Data acquisition at 35 Hz
Advantages of HRM

- Decreased procedure time (8.1 vs. 24.4 min)
- No need to reposition catheter
- Improved patient tolerance
- Improved ability to detect/classify motility disorders and LES abnormalities
- Intuitive, image-based display

HRM (Normal)
HRM (Normal)

UES Relaxation

Transition Zone

Esophageal Body Motility

UES Relaxation
Figure 4. Identification of a hiatal hernia. Two distal high-pressure zones can be readily seen as color bands across the lower portion of the tracing. The most distal high-pressure zone is the location of the diaphragmatic crus, and the more proximal zone is the high-resolution manometry image of the lower esophageal sphincter.
HRM (Achalasia)

Simultaneous Waves

Impaired LES relaxation
Determinants of EG Junction Competence

1) Intrinsic LES
   a. Pressure
   b. Overall length
   c. Abdominal length

2) EG junction compliance

3) Integrity of phrenoesophageal ligament

4) Angle of His (“flap valve”)

5) Extrinsic compression of LES by crural diaphragm (CD)
High-Resolution Manometry of the EGJ: An Analysis of Crural Diaphragm Function in GERD

John E. Pandolfino, M.D., Hyon Kim, M.D., Sudip K. Ghosh, Ph.D., John O. Clarke, M.D., Qing Zhang, M.D., and Peter J. Kahrilas, M.D.

Department of Medicine, The Feinberg School of Medicine, Northwestern University, Chicago, Illinois

Am J Gastroenterol 2007;102:1056-1063
Matlab™ Software

EGJ Pressure Component Separation

**GERD Patients versus Controls**

- LES-CD Separation: Higher with GERD
- Expiratory EGJ Pressure: Lower with GERD
- Inspiratory EGJ Augmentation: Lower with GERD
Ambulatory pH Testing

• Single -- positioned 5 cm above top of LES
• Dual
  – Distal esophageal only
  – Distal esophageal and gastric
  – Distal esophageal and proximal esophageal / pharyngeal / tracheal
Ambulatory pH Testing

• DeMeester score
  – Total number of reflux events
  – Number of episodes > 5 min.
  – Duration of longest episode
  – % Total time pH < 4
  – % Upright time pH < 4
  – % Supine time pH < 4
Bravo pH Probe
Esophageal Impedance Testing

Limitations of pH monitoring

• Non-acid reflux events not detected
• Height and quantity of refluxate not assessed
• Physical nature of refluxate cannot be determined (liquid, gas, mixture)
• Reflux symptoms (e.g. regurgitation and cough) may be present in the absence of demonstrable reflux of acid.
Esophageal Impedance Testing

What is Impedance?

• Impedance = Voltage / Current
• A measure of electrical conductivity of a hollow organ and its contents
• Impedance is inversely proportional to the electrical conductivity of the luminal contents and the cross-sectional area of the lumen
  – Air: Low conductivity and high impedance
  – Saliva and food: Increased conductivity, lower impedance
  – Luminal dilation: Increased conductivity, lower impedance
Esophageal Impedance Testing

How is it Done?

• Catheter with electrodes at 2, 4, 6, 8, 14 and 16 cm from distal tip
• An extremely low electric current (0.00025 microwatts) is transmitted across the electrodes, below the stimulation threshold for nerves, muscles, heart.
• A standard pH sensor is positioned 5cm from distal tip
MII-pH Catheter

Is GERD the Cause of Cough/Asthma/Laryngeal Complaints?

Diagnostic Algorithm

Test or treat?
Trials of Medical Therapy for GERD-Related Cough, Asthma or Laryngeal Complaints

Common Flaws

• Inadequate acid suppression
  – (PPI BID  Nighttime H2RA)

• Insufficient duration of therapy
  – (3-6 months)
Standard Approach To GERD in Patients with Asthma or Cough

PPI BID x 3 months

- Improved
  - Maintenance Therapy
    - PPI
    - H2RA
  - Antireflux Surgery
- Not Improved
  - Not GERD-related
    - pH monitoring on therapy

Limited Value of pH Monitoring on Therapy

- 115 patients with persistent extraesophageal symptoms on BID PPI therapy
- Incidence of abnormal pH < 2%
  - Assessed standard pH scores
  - Did not correlate symptoms with reflux episodes (i.e. did not use symptom index)
- Non-acid reflux events not detected

New GERD Diagnostic Algorithm

Suspected GERD

Trial of PPIs

Success

Persistent Symptoms

Ambulatory MII-pH Monitoring on Rx

Acid GERD

Non-Acid GERD

No GERD
Combined multichannel intraluminal impedance-pH monitoring to select patients with persistent gastro-oesophageal reflux for laparoscopic Nissen fundoplication

I. Mainie, R. Tutuian, A. Agrawal, D. Adams and D.O. Castell

Conclusion: Patients with a positive symptom index resistant to PPIs with non-acid or acid reflux demonstrated by MII-pH monitoring can be treated successfully by laparoscopic Nissen fundoplication.

British Journal of Surgery 2006;93:1483-1487
Fundoplication Outcomes Based on Results of Combined Impedance-pH Monitoring

19 patients

NAR
- Cough – 7
- Heartburn - 3
- Regurgitation -3
- Throat clearing - 1

Acid Reflux
- Heartburn - 3
- Nausea - 1

Symptoms not associated with reflux
- Heartburn - 1

Symptoms not associated with reflux
- Heartburn - 3
- Cough – 7
- Heartburn - 3
- Throat clearing - 1
Limitations of a Therapeutic Trial for GERD-Related Respiratory Symptoms

• Prolonged, intensive treatment course
• Symptoms may improve spontaneously or due to other medical therapies
• Nonacid reflux may persist despite intensive acid suppression
• Reliability of symptom index?
Association of Gastroesophageal Reflux and O₂ Desaturation: A Novel Study of Simultaneous 24-h MII-pH and Continuous Pulse Oximetry

R. Salvador • T.J. Watson • F. Herbella • A. Dubecz • M. Polomsky • C.E. Jones • D.R. Raymond • J.H. Peters

Division of Thoracic and Foregut Surgery, Department of Surgery, University of Rochester School of Medicine and Dentistry, Rochester, NY, USA
Pulseox-300i with Finger Probe

Konica Minolta Sensing, Inc.

(Accuracy for SpO₂ 2%; measurements every 1 sec)
Definitions:

• **Proximal reflux:**
  – pH<4 in proximal pH sensor (20 cm above LES)
  – Reflux in 2 proximal impedance sensors (15 and 17 cm above LES)

• **Oxygen desaturation:**
  – SpO\(_2\) < 90% or;
  – SpO\(_2\) drop of ≥ 6%

• A reflux-desaturation association present if desaturation occurred within 30 sec prior to or 10 min after a reflux event
Association between Reflux Episode and O₂ Desaturation
100
80
60
40
20
0
% association reflux / desaturation events by patients

respiratory symptoms
esophageal symptoms

p<0.0001
respiratory symptoms
esophageal symptoms

% association
reflux / desaturation events

acid reflux
non acid reflux

(p<0.001 between symptom groups)
Simultaneous MII-pH and Pulse Oximetry: Conclusions

• “A remarkably high prevalence of O₂ desaturation associated with GER was noted in patients with respiratory symptoms”

• “Given further study, may lead to the development of a practical and easily applied diagnostic test in this difficult group of patients”
Evaluation for Antireflux Surgery

Conclusions

• Be fastidious in:
  – Symptom assessment
  – Diagnostic evaluation
  – Patient selection

• Fundoplication an excellent option for patients with moderate/severe, chronic GERD, given:
  – The right patient
  – The right expectations
  – The right surgeon
  – The right operation
“One of the first duties of the physician is to educate the masses not to take medicine.”

- Sir William Osler
“Quality of Life after Antireflux Surgery Compared with Nonoperative Management for Severe Gastroesophageal Reflux Disease”

*University of Pittsburgh Experience*

- 120 patients underwent lap. fundoplication
- 51 patients treated medically
- Outcomes measured with SF-36 and HRQOL at median F/U of 18 months (surgical arm) and 23 months (medical arm)
- Heartburn scores and global QOL scores superior after laparoscopic fundoplication

Arguments for the Use of Acid Suppression Medications

• No particular expertise necessary to prescribe
• No detailed work-up necessary
• Low morbidity / side effects
• Rare mortality
• No irreversible consequences
• Efficacious in many
Arguments Against the Use of Acid Suppression Medications

- May require lifelong daily therapy, even in multiple doses
- Compliance
- Cost
- Desire not to take meds (especially younger patients)
- Long-term risks (impaired calcium absorption, decreased bone density, etc.)
- Is quality of life as good compared to surgical therapy?
Arguments for the Use of Fundoplication

- Effective at controlling typical symptoms
- Safe in experienced hands
- Usually durable
- Low incidence of severe side effects
- Generally good quality of life
Arguments Against the Use of Fundoplication

- Perioperative morbidity / mortality
- Potential for breakdown
- Side effects
Decision for antireflux surgery weighs:

1) Control of GERD
   AGAINST

2) Complications / recovery

3) Side effects

4) Durability
Surgery for GERD

**Conclusions**

- Surgical referral should be considered for patients with chronic reflux, particularly if symptoms are difficult to control on medical therapy and in the setting of severe pathophysiologic derangements.
- An open, “fair and balanced” discussion of risks and benefits of available options, both medical and surgical, should occur so that informed decisions can be made.
- Patients, therefore, undergo surgery because they choose it, not because they need it.
## Causes of Fundoplication Failure

**Open versus Laparoscopic**

<table>
<thead>
<tr>
<th>Cause of Failure</th>
<th>Open Fundoplication (n=29)</th>
<th>Laparoscopic Fundoplication</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Emory (n=31)</td>
</tr>
<tr>
<td>Herniation</td>
<td>5 (22%)</td>
<td>26 (84%)</td>
</tr>
<tr>
<td>Disruption</td>
<td>15 (39%)</td>
<td>1 (3%)</td>
</tr>
<tr>
<td>Slipped/misplaced</td>
<td>5 (22%)</td>
<td>1 (3%)</td>
</tr>
<tr>
<td>Too tight/long</td>
<td>3 (13%)</td>
<td>1 (3%)</td>
</tr>
<tr>
<td>Achalasia</td>
<td>1 (4%)</td>
<td>0</td>
</tr>
<tr>
<td>Twisted</td>
<td>0</td>
<td>2 (6%)</td>
</tr>
</tbody>
</table>

How do we define failure?

- Symptomatic
- Anatomic / physiologic
Factors Underlying the Tailored Approach to Antireflux Surgery

1) *Esophageal body function*

- Peristalsis normal or non-specific motility disorder: Complete wrap (*Nissen*)
- Severe motility disorder: Partial wrap (*Toupet, Belsey*)
Question 1:

Why not use a partial fundoplication routinely on all patients undergoing antireflux surgery?
Laparoscopic Partial (Toupet) Fundoplication as a Primary Repair for ALL Patients with GERD

Evaluation of 100 Consecutive Patients

- 6% (5/83) of patients complained of recurrent heartburn at 3 month follow-up
- 20% (15/74) of patients complained of recurrent heartburn at 22 month follow-up
- Only 8% symptomatic recurrence after Nissen

Laparoscopic Partial (Toupet) Fundoplication as a Primary Repair for ALL Patients with GERD

Evaluation of 100 Consecutive Patients

- 51% of patients had excessive esophageal acid exposure on pH testing at 22 month follow-up
- Only 4% of patients after Nissen had documented reflux post-operatively

Laparoscopic Toupet Fundoplication Is an Inadequate Procedure for Patients With Severe Reflux Disease

Karen D. Horwath, M.D., Blair A. Jofe, M.D., Daniel M. Herron, M.D.,
Lee L. Swanson, M.D.


Heartburn Is More Likely to Recur after Toupet Fundoplication than Nissen Fundoplication

TIMOTHY M. FARRELL, M.D., STEPHEN B. ARCHER, M.D., KATHY D. GALLOWAY, R.N., GENE D. BRANUM, M.D.,
C. DANIEL SMITH, M.D., JOHN G. HUNTER, M.D.

From the Emory University School of Medicine, Atlanta, Georgia


Patterns of success and failure with laparoscopic Toupet fundoplication

R. C. W. Bell,1 P. Hanna,2 M. R. Mills,3 D. Bowrey4

1 Department of Surgery, Swedish Medical Center, 499 East Hampden, Suite 450, Englewood, CO 80110, USA
2 Department of Medicine, Swedish Medical Center, 499 East Hampden, Suite 470, Englewood, CO 80110, USA
3 Parker Memorial Hospital, 2535 South Downing, #600, Denver, CO 80210, USA
4 University of Southern California Health Sciences Center, Department of Surgery, 1510 San Pablo Street, #514, Los Angeles, CA 90033-4612, USA

Surg Endosc 1999;1189-1194
Question 2:

Why not use a complete fundoplication routinely on all patients undergoing antireflux surgery?
## Dysphagia After Laparoscopic Antireflux Surgery

### The Impact of Operative Technique

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Immediate Dysphagia</th>
<th>Dysphagia at 3 Months</th>
</tr>
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<tbody>
<tr>
<td>Nissen: Short Gastrics Preserved</td>
<td>54%</td>
<td>11%</td>
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<tr>
<td>Nissen: Short Gastrics Divided</td>
<td>17%</td>
<td>2%</td>
</tr>
<tr>
<td>Toupet</td>
<td>16%</td>
<td>2%</td>
</tr>
</tbody>
</table>

“The effect of symptoms and nonspecific motility abnormalities on outcomes of surgical therapy for gastroesophageal reflux disease”

• 100 consecutive patients undergoing open abdominal Nissen fundoplication
  – 56% with normal esophageal body motility
  – 44% with non-specific motility disorder; pts. with severe motility disorder excluded

• 93% overall success rate at relieving heartburn and regurgitation

• No difference in relief of GERD symptoms or persistent post-op dysphagia between groups

Bremner, DeMeester, Crookes, et al. JTCVS 1994;107:1244;50
"Oesophageal dysmotility is not associated with poor outcome after laparoscopic Nissen fundoplication"

- 81 pts; 48 with normal motility and 33 with dysmotility, 16 with severe dysmotility
- **No difference** between groups in post-op dysphagia at one year follow-up (12.5% in normal group, 15% in dysmotility group (p=0.9))
- High overall incidence of dysphagia possibly related to surgical technique
- Authors argue for selective use of pre-op manometry

Factors Underlying the Tailored Approach to Antireflux Surgery

2) Esophageal length

- Normal length: Abdominal approach (open or laparoscopic)
- “Shortened esophagus”: Thoracic approach
Massive Hiatus Hernia: Evaluation and Surgical Management

The Toronto Experience

- 94 pts. with paraesophageal hernias over 36 years (1960-1996)
- 97% underwent transthoracic repair with fundoplication
- 80% underwent Collis gastroplasty
- 5 pts. required re-operation, 2 for leaks
- 93% excellent / good results

Maziak, Todd and Pearson. JTCVS 1998;115:53-62
Recurrent Herniation after Laparoscopic Repair of Paraesophageal Hernias

<table>
<thead>
<tr>
<th>Author</th>
<th>Patients</th>
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<td>Hinder</td>
<td>46</td>
<td>15%</td>
</tr>
<tr>
<td>Swanstrom</td>
<td>52</td>
<td>8%</td>
</tr>
<tr>
<td>Peters</td>
<td>21</td>
<td>42%</td>
</tr>
<tr>
<td>Jobe</td>
<td>34</td>
<td>32%</td>
</tr>
<tr>
<td>Hunter</td>
<td>42</td>
<td>33%</td>
</tr>
</tbody>
</table>
Factors Underlying the Tailored Approach to Antireflux Surgery

3) *Prior upper abdominal operations*

- First operation: *Laparoscopic*
- Re-do procedure: *Thoracic*
Factors Underlying the Tailored Approach to Antireflux Surgery

4) **Body habitus**

- Normal: Laparoscopic
- Obese: Laparoscopic or Thoracic
Trends in the Tailored Approach

First Time Operation

Re-do Operation

Shortened Esophagus

Poor Motility

Laparoscopic Nissen Fundoplication
( + / - Collis Gastroplasty)
“Quality of Life and Perceptions after Nissen Fundoplication are Independent of the Surgical Approach”

- Lap. Nissen (LN) in 72 pts.; thoracic Nissen (TN) in 33 pts. (median F/U 25 and 31 mos, respectively)
- Need for postop acid-suppression: LN=24%, TN=9%
- Satisfaction with surgery: LN=92%, TN=97%
- Conclusion: “Long-term QOL was independent of the surgical approach, but significantly dependent upon successful elimination of reflux symptoms and need for acid-suppression medication.”

Surgery for GERD

Summary

• An appropriate consideration in patients with recurrent, progressive disease or in those who have become medication-dependent.

• Detailed preoperative testing is essential to confirm the diagnosis of GERD and to determine the appropriate operative procedure.

• Surgery is more cost-effective than medical therapy long-term and with a better control of reflux.
Conclusions: “During treatment with omeprazole, postprandial reflux becomes predominantly nonacid. Symptoms are more common with acid reflux but are also produced by nonacid reflux. Simultaneous intraesophageal impedance and pH may be useful in evaluating the role of nonacid reflux in symptoms that persist despite adequate acid suppression.”
Extraesophageal Manifestations of GERD

<table>
<thead>
<tr>
<th>ENT (LPR)</th>
<th>Pulmonary</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Laryngitis</td>
<td>• Cough</td>
</tr>
<tr>
<td>• Pharyngitis</td>
<td>• Asthma</td>
</tr>
<tr>
<td>• Otitis</td>
<td>• Pulmonary fibrosis</td>
</tr>
<tr>
<td>• Sinusitis</td>
<td>• Chronic bronchitis</td>
</tr>
<tr>
<td>• Hoarseness / voice changes</td>
<td>• Pneumonia</td>
</tr>
<tr>
<td>• Throat clearing</td>
<td></td>
</tr>
<tr>
<td>• Globus sensation</td>
<td></td>
</tr>
<tr>
<td>• Subglottic stenosis</td>
<td></td>
</tr>
<tr>
<td>• Dental erosions</td>
<td></td>
</tr>
</tbody>
</table>
What Do Antireflux Operations Do?

• Restore LES physiology
  – Resting parameters (LES pressure, overall and intraabdominal length)
  – Dynamic parameters (LES relaxation in response to gastric distention)

• Restore anatomy
  – Reduce hiatal hernia
  – Restore intraabdominal esophagus
The Evolution of Surgery versus Medical Therapy for GERD

• 1975: Behar (NEJM) -- surgery superior to antacid therapy
• 1992: Spechler (NEJM) -- surgery superior to H2 blockers
• 2001: Lundell (J Am Coll Surg) -- surgery superior to omeprazole (?)
Comparison of Medical and Surgical Therapy for Complicated Gastroesophageal Reflux Disease in Veterans

*Results of a Prospective, Randomized Trial*

- Conclusions: “In men with complicated gastroesophageal reflux disease, surgery is significantly more effective than medical therapy in improving the symptoms and endoscopic signs of esophagitis for up to two years.”

“Continued (5-year) Follow-up of a Randomized Clinical Study Comparing Antireflux Surgery and Omeprazole in Gastroesophageal Reflux Disease”

Nissen Fundoplication for GERD

Evaluation of Open Primary Repair in 100 Consecutive Patients

- 91% effective in the control of reflux symptoms over a period up to 10 years

Principles of Antireflux Surgery

- GERD is not due to too much acid, but rather gastric content (acid/bile/etc.) in the wrong place!
- Medical therapy does not re-create the barrier to gastric reflux, but merely reduces the acidity of the refluxate.
- The aim of surgery is restoration of normal physiology.
Laparoscopic Nissen Fundoplication for GERD

Prospective Evaluation of 100 Patients with “Typical” Symptoms

- 96% effective at relieving the primary symptom responsible for surgery at a mean follow-up of 21 months

Number of Patients Taking Different Doses of Omeprazole During the 5 Years of Study

- Omeprazole 20 mg.
- Omeprazole 40 mg.
- Omeprazole 60 mg.
Medical vs. Surgical Therapy for GERD

Conclusions

• Medical therapy is safe and effective for the control of reflux symptoms and erosive esophagitis if adequate dosages are given and the patient is compliant.

• Surgical therapy offers improved reflux control to many individuals, is generally safe and well-tolerated, though carries the potential for morbidity and side effects.
A Randomized Trial of Laparoscopic and Open Fundoplication

GERD Treatment Goals*

• Relieve symptoms
• Improve quality of life
• Resolve esophagitis (i.e. heal mucosal injury)
• Prevent complications (strictures, Barrett’s, cancer)
• Normalize quantity and quality of refluxate

(* maintained for the lifetime of the patient...*)
Indications for Antireflux Surgery

• Need for continuous medical treatment
• Escalating doses of PPI
• Particularly if:
  – Young age (<50)
  – Financial burden
  – Non-compliance with meds
  – Patient choice for surgery
A New Era in Esophageal Diagnostics: The Image-Based Paradigm of High-Resolution Manometry

Renato Salvador, MD, FACS, Attila Dubecz, MD, Marek Polomsky, MD, Oliver Gellerson, MD, Carolyn E Jones, MD, Daniel P Raymond, MD, Thomas J Watson, MD, Jeffrey H Peters, MD, FACS

BACKGROUND: The development of high-resolution (HRM) catheters and software displays of manometric recordings in color-coded pressure plots has changed the diagnostic assessment of esophageal disease. HRM may offer advantages over conventional methods, including improved identification of motility disorders, hiatal hernia, and outflow obstruction, and ease interpretation.

STUDY DESIGN: HRM studies were obtained in 50 healthy volunteers and 106 patients. HRM was performed using a 36-channel catheter, with sensors spaced at 1-cm intervals. Manometric findings were classified into abnormalities of the gastroesophageal barrier and those of the esophageal body and validated by comparison with endoscopic and radiographic diagnostic methods.

RESULTS: The mean time for HRM was significantly lower than that for a conventional method (8.1 versus 24.4 minutes; p < 0.0001). A structurally defective lower esophageal sphincter (LES) was present in 53 (57.3%) patients, a hypertensive LES in 6 (7.8%), and impaired LES relaxation in 17 patients (16.7%). Validating the LES findings, 86.3% (44 of 51) of patients with a defective sphincter by HRM had radiographic or endoscopic evidence of a hiatal hernia, and 80% (41 of 51) had a positive pH study, endoscopic erosive esophagitis, or Barrett’s esophagus. Evidence of a hiatal hernia by HRM was seen in 33 (56%) patients; a hiatal hernia was seen in 91% (30 of 33) of those on endoscopy and 81% (17 of 21) on barium swallow. Fifty-eight patients (54.7%) had an abnormal body motility.

CONCLUSIONS: HRM studies are shorter than those using conventional methods. Interpretation is image based, and correlation with objective endoscopic and physiologic findings confirms the accuracy of interpretation. The introduction of HRM is a significant advance in the outpatient evaluation of esophageal function. (J Am Coll Surg 2009;208:1035–1044. © 2009 by the American College of Surgeons)
Esophageal Impedance Testing

Findings

• Impedance waves correspond well to bolus transport as assessed by cineradiography
• Bolus entry, transit and exit can be measured by impedance changes in the corresponding segments
• Episodes of GER can be detected without regard to chemical composition
• In normal subjects PPI therapy does not alter the number of reflux episodes; it simply converts them to neutral pH.