Robotic and Minimally Invasive Approaches to Hiatal and Paraesophageal Hernias (and Other foregut surgery)

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Kettering Medical Center
Objectives

• Review pertinent anatomy of the foregut
• Discuss non-malignant foregut pathologies
• Review treatment options focusing on surgical intervention
• Explain benefits of minimally invasive approach to these conditions
Gastroesophageal (GE) Junction

- Esophagus
- Diaphragm
- Right Crus of Diaphragm
- Left Crus of Diaphragm
- Sphincter
- Fat pad
- Stomach
- High Pressure Zone
Phrenoesophageal Membrane

- Formed from fascia transversalis on under surface of diaphragm
- Elastic membrane that inserts into esophageal musculature circumferentially
- Responsible for pulling squamocolumnar junction back to position after peristalsis
Reflux and Treatment
Gastroesophageal Reflux

• Typical “heartburn”
  – Tightness in the chest, sour taste in the mouth, regurgitation, nausea, etc.
  – Barrett’s Change

• Or Laryngopharyngeal Reflux (LPR)
  – Hoarseness, “lump” in the throat, chronic cough, asthma, apnea

  – A lot of crossover between the two.
Workup

• Typically treat first – H2 Blocker, PPI

• Continued Workup (persistent symptoms)
  – EGD – Barrett’s Change? Hiatal Hernia? Peptic Stricture?
  – pH Probe (Bravo Probe)
  – Manometry?
  – Desire to not be on meds, failure of meds...
EGD

• Barrets Metaplasia –
  – No Change in risk for adenocarcinoma

• Peptic Stricture – treatment at time

• Both are diagnostic for acid exposure consistent with severe GERD.
Peptic Stricture (Schatzki’s ring)

- Due to or protective against reflux

   - Dilation
Peptic Stricture
pH Probe

• 24 hour or “BRAVO” probe
  – deMeester score > 14.72
  – Any time pH < 4:
    • >5.5% of the time total
    • >8.3% of the time upright
    • >3% of the time supine
    • >1.6% of total time.

• Unless suspicious of motility disorder manometry is un-necessary
Surgical GERD Management

- TIF – Transoral incisionless fundoplication
  - Hiatal hernia <3cm
  - No stricture
Surgical Management of GERD

• Fundoplication
Outcomes

• Excellent reduction in symptoms (>90% at 10 years)

• Complications -
  – Slipped wrap
  – Herniated wrap
  – Ruptured wrap
  – Wrap too tight – older complication
Video to follow the next section...
Hiatal and Paraesophageal Hernias
History

• Initially thought to be congenital diaphragmatic defect
• First description of paraesophageal hernia on postmortem exam (1903)
• Akerlund coined *hiatus hernia* and created classification
• Advances in imaging improved diagnosis and identification antemortem
Epidemiology of Paraesophageal Hernia

• Incidence of hiatal hernia 15-20% in US
  – < 40 yrs - 10%
  – > 70 yrs - 70%

• Paraesophageal defects make up 5% of all hiatal hernias

• More common in females

• More common in obese patients
Types of Hiatal Hernia

• Type I - sliding hernia
• Type II - pure paraesophageal hernia
• Type III - mixed type
• Type IV - Paraesophageal hernia with add’l organs (spleen, transverse colon, pancreas)
Types of PEH

• Type 1 – Hiatal Hernia
  – Defect at the diaphragmatic hiatus
  – Cephalad displacement of the lower esophagogastric sphincter above the level of the diaphragm
  – Phrenoesophageal membrane remains intact
  – “sliding” hernia
  – Most common (80%)
Types of PEH

• Type 2
  – GE junction (LES) in proper place
  – Stomach herniates adjacent to the GE junction through the phrenoesophageal membrane
  – Very rare
Types of PEH

• Type 3
  – Combined type (LES and stomach) herniated through the phrenoesophageal membrane
  – Concern for volvulus as entire stomach herniates
  – Most common PEH (15%)
  – Can pull other abdominal contents into the chest creating Type IV PEH
Types of PEH

• Type 4
  – Type 3 PLUS other abdominal contents pulled into the chest
  – Colon, spleen, liver, small intestine
Clinical Diagnosis

- Typically asymptomatic
- GERD
- Dysphagia
- Post-prandial LUQ pain
- Inability to vomit
- Unable to pass nasogastric tube
- Occult anemia

Borchardt’s Triad
Cameron’s Ulcers

- Responsible for 10-20% incidence of anemia
- Occur ~ 20% of large paraesophageal defects
- Gastritis or ulceration within pouch
- Mechanical irritation at crura
Gastric Volvulus

- Organoaxial (longitudinal)
  - bad

- Mesenteroaxial (transverse)
  - Less bad
Diagnosis

- Barium esophagram
- CT chest or abdomen
- Double lumen on endoscopic retroflexed view
Gastric Volvulus

• Can be surgical emergency
• Laparoscopic or open approach
• IF gastric ischemia then resection +/- gastropexy
• IF no ischemia then decision to repair
  – Formal Repair
  – Gastropexy
  – Double PEG gastropexy?
Minimally invasive management of paraesophageal herniation in the high-risk surgical patient

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Fig. 1. Intracorporeal gastroscopy sutures placed between preanastomotic endoscopic gastrosyne (PRG) tubes provide additional points of fixation for the stomach.
Medical Management

Free Offer Ends Thursday, October 29, 2009

FREE Limited-Time Offer

Hiatal Hernia Pain Gone In As Little As 1 Day...
Even if you’ve suffered for years

"Sherry: I have a hiatal hernia and constant sinus problems. I have been on your plan now for one week and two days, and here are my improvements to date:
- Nausea feeling is gone.
- Soreness and burning between rib cage is drastically improved.
- Sinuses have improved 75%.
- Constant cough from drainage is almost gone.
I cannot believe how good I feel. Thank you for helping me after 20 years of suffering."
- C. Boyd

Dear Hiatal Hernia Sufferer:
As you know, hiatal hernia can make your life miserable. But it is now possible to not just reduce your pain, but to eliminate it all together, forever.... Without drugs, surgery or bland foods.

Sherry Brescia
Health Researcher
Creator of Great Taste NO Pain

Yours FREE!

Procedures: On an empty stomach, and when you know you will be on your feet for at least several hours, drink 2-4 glasses of water. The idea here is to place as much weight into the stomach as is possible and you can stand. Immediately after this, locate a stool, or stand on the second step from the bottom of a staircase. What you want to do is to step off of the small stool, or stairs, and land quite firmly on your feet. You DON’T want to absorb the shock of the landing with your legs or knees. You want the momentum of the downward motion of the stomach to continue on firmly after you land on the floor. This momentum will actually pull the stomach down in the abdominal cavity, repositioning it where it belongs.

Natural Health Care for a Natural YOU!

Indigestion, Heartburn and Hiatal Hernia;
Causes and Treatment Report!
To Repair or Not To Repair?
Watchful Waiting?

• “Surgical Management of Esophageal Reflux and Hiatus Hernia. Long-Term Results with 1,030 Patients”
  • *DB Skinner, RH Belsey* (1967)
• 6 of 21 patients with paraesophageal hernia treated medically died of complications of incarceration, perforation, and bleeding
• Elective surgical repair mandated
Natural History

- Review of Finnish administrative database
- From 1987-2001, 563 pts (operative repair) vs. 67 pts (watchful waiting)
- 3 deaths after elective repair
- 11/67 (16.4%) died after watchful waiting
- Causes of death:
  - Incarceration 75%
  - Complications from surgery 18.8%
  - GI bleed 6.2%

Nonoperative Management

- 23 asymptomatic patients w/ PEH
- Followed for median of 78 months
- Only 4 pts had progression of symptoms
- 3 cases of gastric strangulation in 735 patient years
- Only death due to aspiration during esophagram

Operate or Observe?

• Statistical analysis of HCUP-NIS database
• Operative mortality in emergent repair only 5.4%
• Annual probability of requiring emergent surgery only 1.1%
• Watchful waiting was beneficial in 83% of patients, elective surgery only 17%

Stylopoulos N, Rattner DW. *Ann Surg* 2002;236:492
Outcomes

• Improvement in pulmonary complaints
  – Improvement in spirometry values
    • FEV1, FVC (14-16% improvement)
  – Dyspnea index
  – Pulmonary quality of life scores

• Improvement in Iron Deficiency anemia

Management

• Type I
  – Treat underlying reflux symptoms
  – No indication for surgery when asymptomatic

• Types II - IV
  – Risk of gastric volvulus, strangulation
  – Surgery mandated for symptomatic pts
    • *Symptoms infrequently related to reflux
Surgical Repair

1) Reduction of herniated contents
2) Excision of hernia sac
3) Closure of crural defect
4) Anti-reflux procedure (+/-)
5) Gastropexy
Mesh Reinforcement of the Hiatus
Recurrence following Lap PEH Repair

- 38 consecutive patients
- Concomitant fundoplication (29 pts)
- Recurrence rate 6% based on symptoms
- Routine esophagram revealed 6 add’l recurrences
- Overall recurrence 22%

Recurrence following lap PEH repair

• Median 587 month follow up recurrence
  – No Mesh – 59%
  – Mesh – 54%

• However:
  – >95% satisfaction rate with symptom improvement
  – Only 3% reoperation on recurrences required

• Mesh is optional (recommended by SAGES)**

Got Mesh?

- Basis for tension-free repair everywhere else in abdomen
- Bridge defect or reinforce closure
- Concern for synthetics at hiatus
Minimally Invasive Options for Repair
Choices of Surgical Access

Open Surgery

Minimally Invasive and Robotic Surgery
**Minimally Invasive Approach**

**Traditional (Open)**
- Equal OP time
- Question of lower recurrence
- Longer Hospital LOS
- Higher Morbidity
- Increase pain scores
- Hernias, abdominal wall function

**Minimally Invasive**
- Equal operative time (or faster)
- Equal recurrence
- 24 hour LOS
- Improved QOL scores
- Decreased morbidity
- Decreased mortality **
- Can still convert if necessary
My personal results

• 23 repairs past 2 years
  – 22 robotic, one open
  – 2 conversion to open (bleeding, esophageal tear)
  – LOS total 1.6 days (excluding conversions 1.1 days)
  – Operative time down
  – Operative cost down
Achalasia
Achalasia

• Symptoms
  – Dysphagia, regurgitation, coughing (supine),
    weight loss, chest pain, aspiration

• Physiologic manifestation
  – Increased resting LES pressure
  – Failure of LES to Relax
  – MOST IMPORTANT FINDING : Aperistalsis
Achalasia

– Diagnosis:
  • Manometry
  • Barium Swallow “Bird Beak”

– Medical Management: Calcium channel blockers, nitrates, dilation, botox (3-6 months)

– Rare causes:
  • T. Cruzi
  • reduviid bug (Chagas disease)
Other Esophageal Dysmotility

• **DES**
  – Unorganized, high amplitude contractions, LES is normal tone and relaxation
  – Rx: same as achalasia, only surgery if unresolved; complete esophageal myotomy of circular layer

• **Nutcracker Esophagus**
  – >180 mm HG high amplitude contractions, o/w nl
  – Rx: Calcium Channel blockers

• **Hypertrophic LES**
  – >45 mmHG resting tone of LES
Surgical Options

- Peroral Endoscopic Myotomy (POEM)
Surgical Options

• Heller Myotomy
  – MIS or open
  – Longitudinal incision of the circular muscle of the esophagus
  – Added fundoplication (reflux control)
## Surgical Options

<table>
<thead>
<tr>
<th>POEM</th>
<th>Minimally Invasive Heller Myotomy</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Limited Availability</td>
<td>• General Anesthesia</td>
</tr>
<tr>
<td>• Still requires general anesthesia</td>
<td>• OR time low</td>
</tr>
<tr>
<td>• Equal operating time</td>
<td>• Minimal instrumentation</td>
</tr>
<tr>
<td>• Equal LOS</td>
<td>• Equal LOS (24 hours or less)</td>
</tr>
<tr>
<td>• <strong>No incisions</strong></td>
<td>• Do have incisions (4 or 5)</td>
</tr>
<tr>
<td>• Post procedural reflux</td>
<td>• Reflux control with fundoplication</td>
</tr>
<tr>
<td></td>
<td>• Equal long term (&gt;90% symptom free 10 yrs)</td>
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Achalasia

• Take home message:
  – Minimally invasive options exist at Kettering Hospital Network
  – Less than 1 day stay
  – Excellent short term outcomes
  – No need to leave the region
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Questions?